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ZABDIEL BOYLSTON, INOCULATOR, AND THE EPIDEMIC OF SMALLPOX IN BOSTON IN 1721.

By Reginald H. Fitz, M. D., Boston, Mass.

The recent centennial celebration, January 6, 1911, of the Boylston Medical Society of the Harvard Medical School, directly leads to the thought who was Boylston whose name is so intimately connected in Massachusetts with towns, buildings, libraries, schoolhouses, corporations, associations, streets, railroad stations, charities, professorships and prizes? "A name," according to John Quincy Adams,[1] "which if publick benefits can impart a title to remembrance, New England will not easily forget: a name to the benevolence, publick spirit and genuine patriotism of which this University, the neighboring metropolis, and this whole nation have long had, and still have many reasons to attest: a name, less distinguished by stations of splendour, than by deeds of virtue; and better known to this people by blessings enjoyed than by favours granted: a name, in fine, which if not encircled with the external radiance of popularity brightly beams with the inward lustre of beneficence."

The Boylstons thus eulogized were members of a family descended[2] from Thomas Boylston, who at the age of twenty years came to this country in 1635 and settled in Watertown, Massachusetts. His son Thomas, born in 1644-5, married Mary Gardner of Muddy River, then a part of Boston, but set off in 1705 as the town of Brookline. This Thomas was the earliest physician and surgeon of Muddy River and died in 1695 at the age of fifty. It is unknown where and how he received his medical training, unless, in part, in the Narragansett War in which he is reported to have been engaged. There is, however, no verification of the statement by Thacher[3] that he was a native of England and obtained the degree of Doctor of Medicine from Oxford. In his married life of thirty years there were born to him twelve children, the sixth being Zabdiel Boylston, who has gained undying fame as the founder in this country of inoculation as a preventive of the disastrous results of smallpox. Although other descendants of the first Thomas Boylston, through their benefactions and achievements, have been more immediately concerned with conferring popular distinction upon the name, it is especially among physicians that the name and fame of Boylston should be connected closest with the memory of this most meritorious physician of his day in America. This is all the more fitting since his nephew Thomas Boylston and his grandnephew, Ward Nicholas Boylston, in announcing their medical benefactions and gifts call particular attention to the great service rendered to humanity by their kinsman. Thomas Boylston's intended benefactions proved valueless in consequence of business reverses which caused the loss of his fortune. Ward Nicholas Boylston, the wealthy merchant, became a patron of medical education through his gifts to Harvard University, and the medical student's society is his namesake. Zabdiel Boylston, however, was a medical hero, of service to all mankind and his example should ever be memorable.

[1] Inaugural oration, when installed Boylston Professor of Rhetorick and Oratory, in June, 1806.

[2] The Vinton Memorial, 1858.

[3] American Medical Biography, 1828, I, 185.

Zabdiel Boylston was born in 1679 and died in 1766 in his eighty-seventh year. He was educated in medicine by his father and by Dr. Cutler, a physician of some note in Boston. He was not a graduate of Harvard College, from which his eldest son Zabdiel was graduated in 1724, afterwards going to England, where he died. Dr. Boylston attracted no especial attention until 1721. He then was living near Dock Square, not far from the residence of the Reverend Benjamin Colman,[4] pastor of the Brattle Street Church, who refers to "my house (which faces into the Doctor's yard)" and from which he was able to observe the behavior of the doctor's patients. At this time he was presumably one of the practitioners of medicine referred to by Dr. Douglass,[5] who states that there were fourteen apothecary shops in Boston and that every practitioner dispensed his own medicines. Indeed, he is called[6] an apothecary by an anonymous writer not friendly disposed to his cause. It is evident, however, from a communication to the *Boston News-Letter* of July 17-24, 1721, No. 912, signed W. Philanthropos, but written in the manner of Dr. Douglass, that his practice was also surgical. In this he is called a *"Cutler for the Stone"* and is spoken of as illiterate, ignorant and the producer of a *"dangerous quack advertisement,"* with but little experience in smallpox and without having at the time a patient with the smallpox under his charge.

Further evidence of Dr. Boylston's surgical qualifications is to be found in the Province Laws.[7] In these it appears that in 1707 he treated Captain Gridley for a broken arm accidentally received while in the expedition to Nova Scotia. In the same year he treated Mary Lyon, "grievously wounded by a Negroe Man," and in 1712 he cared for Joseph Smith, a soldier in the "late designed expedition to Canada." But whatever may have been the other medical or surgical qualifications of Dr. Boylston, they are wholly subordinate to his great work in beginning and continuing the inoculation of smallpox.

Towards the end of April, 1721, Boston for the sixth time was invaded by this disease. It had then a population of about 11,000. Aeneas Salter, at the close of the epidemic, was employed by the selectmen to make a scrutiny of the inhabitants and found[8] "that the number of persons who continued in Boston (many fled into the country) were 10,567, whereof about 700 escaped; the small-pox decumbitents had been 5,989, whereof 894 died, which is nearly one in seven." Of the previous epidemics that of 1678 had been especially fatal and that of 1702 was of recent memory to many of the inhabitants. Since 1702 the population had nearly doubled in number and a generation of unprotected children had been born. It was announced in the *Boston News-Letter* of April 13-17, 1721, No. 893, that twenty or thirty deaths from smallpox were taking place daily at Barbadoes. In the following week it was stated[9] that the Saltertudas fleet had arrived bringing the disease to the town. Sewall writes in his diary:[10]

April 15th. . . . . Hold another Council about giving Liberty to Mr. Frizzle's Ship from Salt-Tartuda (Tortugas) to come up.

On the 8th of May it is learned:[11]

. . . . whereas a Certain Negro man is now Sick of the Smal pox in the Town who came from Tertudos in His Majesties Ship Seahorse which renders it very likely that that distemper may now be on board that Ship. Therefor for the preservation of the Inhabitants of this Town,

Voted that John Clark, Esqre., be Desired to go on board his Majesties Ship Seahorse and Report in what State of health or Sickness the Ship's Company are in, Espetialy with respect to the Smal Pox or other Contagious Sickness.

There being a negro servant sick with smallpox at the house of Captain Paxton, near the South Battery, the first infected, a nurse was ordered to attend the patient and a watch was placed at the door. On the 12th of May it is recorded that the Seahorse is infected with smallpox and the greater part of its company were on a cruise. "Sundry other Sick on Shore, So that there is not aboue ten or fifteen Effective men on Board." The ship was ordered to Bird Island to prevent the spread of the infection. A town-meeting was held on this day and it was voted[12] to seek the advice of the Governor and Council with reference to sending the Seahorse with its two or three cases of smallpox to Spectacle Island, "Pursuant to a Law of this Province to prevent (God willing) the Spreading of the Smal Pox in this Town & Province."

By the middle of May, when the ship Francis left for London, she carried the report that the disease was rife, although in the *News-Letter* of May 15-22, 1721, No. 898, it was stated that on the 20th of May there was but one case and that in the house where the disease first appeared. Nevertheless, a committee appointed to prepare instructions for the Boston representatives in the coming session of the General Assembly proposed,[13] May 22, 1721, among other recommendations,

"That they promote some further Law Effectually to enable the Select men of Each Town to prevent the spreading of any Infectious Sickness among them." A week later it was admitted[14] that on May 27 there were eight cases of the disease, one in Bennett street, three in Tremont street, two in School street, one in Batterymarch street and one in Winter street. On the 5th of June the school was transferred[15] to the Representatives' room in the Town-House.

[4] Some *Observations on the New Method* of Receiving the Smaff-Pox by *Ingrafting* or *Inoculating*. By Mr. Colman, 1721.

[5] Proc. Mass. Hist. Soc., I, 2d Series, 1884-85, 44.

[6] *A Letter* from one in the Country, to his Friend in the City: In Relation to their Distresses occasioned by the doubtful and prevailing Practice of the Inoccufation *Of The* Small-Pox, 1721, 3.

[7] The Acts and Resolves of the Province of Massachusetts Bay, Vols. VIII and IX.

[8] *A Summary*, Historical and Political, *of The* First Planting, Progressive Improvements, and Present States of the *British* Settlements in *North America*. William Douglass, M. D., MDCCLX, Vol. II, 396.

[9] *Boston News-Letter*, April 17-24, 1721, No. 894.

[10] 5 Mass. Hist. Coll., 7, 288.

[11] Selectmen's Minutes, 1721, 81.

[12] Boston Town Records, 1721, 154.

[13] Boston Town Records, 1721, 154.

[14] *News-Letter*, May 22-27, 1721, No. 899.

[15] Selectmen's Minutes, 1721, 83.

The epidemic increased in severity and raged throughout the fall and winter till the following January. The disease extended also to the neighboring towns, especially to Roxbury, Charlestown and Cambridge. In Charlestown it was reported [16] that there were "lately" 100 deaths and that there were not more than ten or twelve families which had not suffered from smallpox.

The physicians of Boston at that time whose names have come down to us, were Drs. Archibald, Boylston, Clark, Cutler, Dalhonde, Davis, Douglass, Perkins, Williams and White. Of these Drs. Clark, Douglass and Williams were liberally educated, Clark and Williams being graduates in Arts of Harvard College. Dr. Archibald had been surgeon of an English warship, Dr. Dalhonde was a Frenchman who had seen service in foreign wars, and Dr. Cutler was favorably mentioned by the leading clergymen, while Dr. Perkins was a pious neighbor of Cotton Mather and of satisfactory skill. Several of these physicians in after years were members of the first medical society established in this country.

At the outset of the epidemic the best educated physician of the town was Dr. William Douglass, a Scotchman of about thirty years of age who had been in Boston some three years and had brought letters of recommendation to Increase and Cotton Mather and to Benjamin Colman. These gentlemen spoke well of him and were of some help to him, although but little general notice was taken of him until he made himself known through his opposition to inoculation. He had received his education in Edinburgh, Paris and Leyden and was the only physician in Boston at the time who had received the degree of Doctor of Medicine, although it does not appear when and where he obtained it. He was a well-read man of intelligence and ability, but was conceited, injudicious, inaccurate and contentious. Dr. Samuel A. Green [17] regards him as "a man of fine intellectual parts and a versatile writer. He knew astronomy and could calculate eclipses; he had a taste for natural history, and was withal an excellent botanist. He studied his medical cases, and took careful notes by the bed side."

In the earlier part of his career, with which we are especially concerned, his failings were more conspicuous than his virtues. A forceful man he soon attained an influential position among his fellows. At first he was favored by the ministers, but as he lost their esteem he became a bitter and violent opponent of their views. According to the Reverend Peter Thacher,[18]

The greater part of the physicians in town & those of most eminence reprobated inoculation in the strongest terms. Douglass placed himself at the head and did not hesitate to use any weapons lawful or unlawful to destroy his antagonists. This man, who had in perfection the hungry penetration and the unrelenting bitterness of his native country (not America), left no method untried to load Dr. B. with obloquy and prevent the success of his practice.

[16] *New England Courant*, Jan. 15-22, 1722, No, 25.

[17] History of Medicine in Massachusetts, a Centennial Address delivered before the Massachusetts Medical Society at Cambridge, 7 June, 1881.

[18] *Massachusetts Magazine*, 1789, I, 776.

Early in the epidemic he was apparently on good terms with Cotton Mather and had lent him certain numbers or a volume of the Philosophical Transactions published by the Royal Society, of which, at the time, he appeared to have had the only copy in Boston. Later another copy was obtained by John Campbell, publisher of the *News-Letter*, although he did not make its presence known [19] until five months after he had received it.

The volume was entitled "Philosophical Translations, Giving Some Account of the Present Undertakings, Studies and Labours of the Ingenious in Many Considerable Parts of the World. Vol. XXIX, for the Years 1714, 1715, 1716. London, 1717."

It may be that Douglass supposed that Mather's interest would lie especially in article IV of No. 339 for April, May and June, 1714, entitled, "An Extract of Several Letters from Cotton Mather, D. D., to John Woodward, M. D., and Richard Waller, Esq., S. R. Secr." There were twelve of these letters on various subjects communicated in 1712. Mather's attention, however, was fixed on article V, "*An Account* or *History*, of the *Procuring* the SMALL POX *by Incision* or Inoculation: As *it has for some time been practised* at Constantinople. *Being the Extract of a Letter* from Emanuel Timonius, Oxon. & Patav., M. D., S. R. S., *dated* at Constantinople, December, 1713. *Communicated to the* Royal Society by John Woodward, M. D., Profes. Med. Gresh. *and* S. R. S." He also undoubtedly studied with care article No. 347 for the months of January, February and March, 1716, entitled, "Nova & TUTA Variolas *excitandi per Transplantationem Methodus nuper inventa & in usum Tracta: Per* Jacobum Pylarinum, Venetum, M. D., & *Reipublicae* Venetae *apud* Smyrnenses nuper *Consulem.*" These articles gave a statement of the method and successful result of the treatment of smallpox in Turkey and neighboring countries by inoculating healthy individuals with the disease.

Cotton Mather was quick to see the bearing of these articles on existing conditions, and the following entry appears in his published diary, for excerpts from which I am indebted to Mr. Worthington C. Ford, of the Massachusetts Historical Society:

May 26, 1721. G. D. The grievous Calamity of the *Small-Pox* has now Entered the Town. The practice of conveying and suffering the *Small-pox* by *Inoculation* has never been used in *America*, nor indeed in our Nation. But how many Lives might be saved by it, if it were practised. I will procure a Consult of our Physicians, and lay the matter before them.

He prepared a letter to the physicians of Boston, giving an abstract [20] of these communications and suggesting some action. As this letter was the beginning of the battle which raged so

[19] *News-Letter*, 1722, March 5-12, No. 945.

[20] To be found in "Some ACCOUNT of what is said of Inoculating or Transplanting the Small Pox by the Learned Dr. *Emanuel Timonius*, and *Jacobus Pylarinus*. With Some Remarks thereon. To which are added, A Few *Quaeries* in Answer to the Scruples of many about the Lawfulness of this Method. Published by Dr. Zabdiel Boylston, 1721."

violently the following extract from it is taken from "A Vindication of the *Ministers* of Boston from the *Abuses* and *Scandals* lately cast upon them in Diverse Printed Papers. 1722, 7."

I will only say (writes the Doctor) that inasmuch as the Practice of suffering and preventing the *Small-Pox* in the way of Inoculation has never yet (as far as I have heard) been introduced into our *Nation;* where there are so many that would give *great Sums*, to have their Lives insur'd, from the *dangers* of this dreadful *Distemper*, nor has ever any one in all *America* ever yet, made the tryal of it (tho' we have several *Africans* among us, as I now find, who tryed it in their own *Country*) I cannot but move that it be *warily* proceeded in. I durst not yet engage, that the *Success* of the tryal here will be the same, as has hitherto been in the other *Hemisphere*. But I am very confident, no person would miscarry in it, but what must most certainly have miscarried upon taking it in the *Common way*. And I would humbly *advise* that it be never made, but under the management of a Skilful Physician who will wisely prepare the Body for it before he performs the Operation. *Gentlemen*, my *request* is, that you would *meet for a Consultation* upon this Occasion, and to *deliberate* upon it, that whoever first begins this practise, (*if you approve that it should be begun at all*) may have the concurrence of his *worthy Brethren* to fortify him in it.

This letter was dated June 6, 1721, and was directed to one of the physicians, a preacher and also "A Worthy Schoolmaster"[21] (whom we did not reproach for going out of his Line for practising Physick)," with the request that he should communicate it to the physicians, with a separate note to one or two of them, and with the express request that Dr. Douglass should not be forgotten but should receive a copy of the letter. The latter gentleman evidently was aggrieved that Cotton Mather, a clergyman, should borrow his books and select therefrom communications upon a medical subject and recommend them to the consideration of the physicians of Boston without consultation with the owner of the books in question. He intimates[22] that before the physicians could meet, consult and report Dr. Boylston had been induced privately to make the trial. Nevertheless, there was no reply from the physicians nor did they hold a meeting, and it is probable that Dr. Douglass was exerting his influence against any action. In the meantime a watch was being set in accordance with the order of the Selectmen[23] of May 6, 1678, to control the removal of infected articles and to prevent the premature appearance in public of the patients. But the epidemic was spreading so rapidly that the guards were being taken from the infected houses as of no use. Persons, among others, Mrs. Boylston, were leaving the town to avoid the risk of contagion. Cotton Mather is filled with great anxiety with regard to two of his children who are liable to acquire the disease. He cannot make up his mind to send them away. He writes in his diary on June 13, "What shall I do with regard unto *Sammy?* He comes home when the small-pox begins to spread in the neighborhood; and he is lothe to return unto *Cambridge.*" His daughter Lizy was in greater fear of the disease than her brother. June 22 he records: "I prepare a little Treatise on the *Small-Pox;* first awakening the Sentiments of *Piety,* which it calls for; and then exhibiting the best Medicines and Methods, which the world has yett had for the managing of it; and finally adding the New Discovery, to prevent it in the way of Inoculation. It is possible that this Essay may save the *Lives,* yea, and the *Souls* of many People. Shall I give it unto the Booksellers? I am waiting for Direction." It would appear from the diary that he made another attempt to interest the physicians for it is written June 23: "I write a letter unto the Physicians, entreating them, to take into consideration the important Affairs of preventing the *Small-pox* in the way of Inoculation."

One of these letters was sent to Dr. Boylston and is reprinted[24] in a memorial of him by the Reverend Peter Thacher, of Brattle Street Church. It reads as follows:

June 24, 1721.

Sir,

You are many ways endeared unto me, but by nothing more than the very much good which a gracious God employs you and honours you to do to a miserable world.

I design it, as a testimony of my respect and esteem, that I now lay before you, the most that I know (and all that was ever published in the world) concerning a matter, which I have been an occasion of its being pretty much talked about. If upon mature deliberation, you should think it advisiable to be proceeded in, it may save many lives that we set a great value on. But, if it be not approved of, still you have the pleasure of knowing exactly what is done in other places.

The gentlemen, my two authors, are not yet informed, that among the [illegible] 'tis no rare thing for a whole company, of a dozen together to go to a person sick of the small pox, and prick his pustules, and inoculate the humour, even no more than the back of an hand, and go home and be a little ill, and have a fever, and be safe all the rest of their days. Of this I have in my neighbourhood a competent number of living witnesse.

But see, think, judge; do as the Lord our healer shall direct you, and pardon this freedom of, Sir,

Your hearty friend and Servant

Co. Mather.

Dr. Boylston.

This letter must have had a very decisive effect on Dr. Boylston's conduct. He was aware that in virtue of his occupation his household was especially exposed to contagion. Intelligent, experienced, skilful, encouraged and supported by an influential citizen of the town, with the undaunted courage accredited to him by Dr. Douglass, he undertook the experiment of inoculation on the 26th of June, 1721. He could not inoculate himself, apparently for the reason that he had suffered from smallpox in 1702, but he was so convinced of the merits of the operation that he inoculated his son Thomas, six years of age, and two of his negro slaves, Jack, thirty-six years old, and Jackey, two and one half years old. According to Hutchinson,[25] "Inoculation was introduced upon this oc-

[21] Presumably Dr. Nathaniel Williams, H. C., 1693, and master of what became eventually the Boston Latin School.

[22] The Abuses and Scandals of some late *Pamphlets* In Favour of Inoculation of the Small Pox, Modestly obviated, and Inoculation further consid'd in a Letter to A.... S...., M. D. & F. R. S., in London, 1722.

[23] Boston Town Records, 1678, 119.

[24] Massachusetts Magazine, 1789, I, 778.

[25] History of the Province of Massachusetts Bay, 1767, II, 273

casion, contrary to the minds of the inhabitants in general, and not without hazard, to the lives of those who promoted it, from the rage of the people." Against Dr. Boylston "the vulgar were enraged to that degree that his family was hardly safe in his house and he often met with affronts and insults in the streets. . . . . Many sober, pious people were struck with horror, and were of opinion that if any of his patients should die, he ought to be treated as a murderer." I find no confirmation of the statement of Thacher[26] that parties with halters threatened to hang him to the nearest tree and that he was obliged to remain secreted for fourteen days in his house in a place known only to his wife and that a handgrenade was thrown into a room occupied by his wife and children. He distinctly states that his wife was out of Boston at the time of his first inoculations and makes no mention of any specific insult offered him either by halters or grenades. As Thacher acknowledges his obligation to Ward Nicholas Boylston, a grandnephew of the inoculator, for information and as the latter was a youth of seventeen at the time of Dr. Boylston's death, it is possible he may have obtained from him an account of personal experiences which were not recorded at the time.

Cotton Mather's diary, however, gives a contemporaneous statement of the behavior of the people.

July 16: G. D. At this time I enjoy *an unspeakable* Consolation. I have instructed one Physician in the New Method used by the *Africans* and *Asiaticks*, to prevent and abate the Dangers of the *Small-Pox*, and infallibly to save the Lives of those that have it wisely managed upon them. The Destroyer, being enraged at the proposal of any Thing, that may rescue the Lives of our poor People from him, has taken a strange Possession of the People on this Occasion. They rave, rail, they blaspheme; they talk not only like Ideots but also like *Franticks*, And not only the Physician who began the Experiment but I also am an Object of their Fury; their furious Obloquies and Invectives.

July 18: G. D. The cursed Clamour of a People strangely and fiercely possessed by the Devil, will probably prevent my saving the lives of my Two Children, from the Small-pox in the way of Transplantation.

The outcry against the inoculations was such that Dr. Boylston felt the need of a public statement which should justify his conduct, and he makes the following announcement[27] in the course of three weeks after his first experiment:

I have patiently *born with abundance of Clamour and Ralary, for beginning a new Practice here, (for the Good of the Publick) which comes well Recommended from Gentlemen of Figure & Learning and which well agrees to Reason*, when *try'd & duly consider'd*, viz., *Artificially giving the Small-Pocks*, by *Inoculation, to One of my Children*, and *Two of my Slaves, in order to prevent the hazard of Life, which is often indanger'd and lost by that Distemper in the Common way of Infection: . . . . until the third Day, my little Son's Fever with the rage of the People, sufficiently affrighted me, but I no sooner us'd means, but the Fever abated and the Small-Pocks came* out. . . . . *And in a few Weeks more, I hope to give you some further proof. And as the Thing was new & for fear of erring in doing, I left it wholly to Nature, which needed no help in my Negro Man, who was taken in a day or two before the other two in which time the Symptoms abating, caus'd me to hope for the same in the others.*

Although twice called to account by those in authority for continuing the practice, he inoculated his son John, thirteen years of age, on the 17th of July, and four days later had seven inoculated patients under his care whom he invited his fellow-physicians to inspect. But one of them, Dr. White, accepted the invitation. It was now that the abusive letter already referred to and signed by W. Philanthropos appeared in the *News-Letter* as a criticism of Dr. Boylston's communication. It credited Cotton Mather with "a Pious & Charitable design of doing good" but had only contempt for Dr. Boylston. Within a few days a reply appeared[28] signed by the so-called inoculation-ministers. It reads as follows:

To the Author of the Boston News-Letter.

Sir

It was a grief to us the *Subscribers*, among Others of your Friends in the *Town* to see Dr. *Boylston* treated so unhandsomely in the *Letter* directed to you last Week, and published in your Paper. He is a *Son* of the Town whom Heaven (we all know) has adorn'd with Some very peculiar *Gifts* for the Service of his Country, and hath signally own'd in the successes which he has had.

If Dr. *Boylston* was too suddenly giving into a new Practice and (as many apprehend) dangerous Experiment, being too confident of the Innocence and Safety of the Method, and of the Benefit which the Publick might reap thereby; Altho' in that Case we are highly obliged to any Learned and Judicious Person who kindly informs us of the hazard and warns against the practice; yet what need is there of injurious Reflections, and any mean detracting from the known worth of the *Doctor*? Especially how unworthy and unjust (not to say worse) is it to attempt to turn *that* to his reproach, which has been and is a singular honour to him, and felicity to his Country? We mean those words in the Letter—*A Certain Cutter for the Stone*—Yes, Thanks be to *God* we have such a One among us, and that so many poor *Miserables* have already found the benefit of his gentle and dextrous Hand. We that have stood by and seen his tenderness, courage and skill in that hazardous Operation cannot enough value the *Man* and give praise to *God*. And we could easily speak of *other Cases* of equal hazard wherein the Dr. has serv'd with such Successes as must render him Inestimable to them that have been snatch'd from the Jaws of Death by his happy hand.

The Town knows and so does the Country how long and what *Success* Dr. *Boylston* has practis'd both in *Physick* and *Surgery;* and tho' he has not had the honour and advantage of an *Academical* Education, and consequently not the *Letters* of some *Physicians* in the Town, yet he ought by no means to be call'd *Illiterate*, ignorant, &c. Would the Town bear that Dr. *Cutler* or Dr. *Davis* should be so treated? No more can it endure to see *Boylston* thus spit at. Nor has it been without considerable *Study*, expence in *travel*, a good *Genius*, diligent Application and much Observation, that he has attained unto that Knowledge and successful practice, which he has to give thanks to God for; and wherein we pray God that he may improve and grow with all humility.

The meanwhile we heartily wish that Men would treat one another with decency and charity, meekness and humility as becomes fallible creatures, and good Friends to one another and their Country.

As to the *Case of Conscience* referr'd to the *Divines*, we shall

[26] Op. cit., 187.

[27] *Gazette*, July 10-17, 1721, No. 85.

[28] Gazette, July 27-31, 1721, No. 88.

only say—What *Heathens* must they be, to whom *this* can be a question.

"*Whether the trusting more the extra groundless Machinations of Men, than our Preserver in the ordinary course of Nature, may be consistent with that Devotion and Subjection we owe to the All-wise Providence of God Almighty.*"

Who knows not the profanity and impiety of trusting in *Men* or *Means* more than in God? be it the best learn'd men or the most proper Means? But we will suppose what in fact is true among us at this Day, that Men of Piety and Learning after much *Serious tho't* have come into an Opinion of the Safety of the saulted method of *Inoculating the small pox;* and being perswaded it may be a means of preserving a Multitude of lives, they accept it with all thankfulness and joy as the gracious Discovery of a *Kind Providence* to Mankind for that end:—And then we ask, Cannot they give into the method or practice without having their *devotion and subjection to the Al-wise Providence of* God *Almighty* call'd in question? Must they needs *trust more* in *Men than in their Great Preserver* in the use of *this means* than of any other? What wild kind of Supposition is this? and the *Argument* falls with the *Hypothesis* in our *Schools.*

In a word, Do we not in the use of all means depend on GOD's *blessing?* and *live* by that alone? And can't a devout heart depend on God in the use of *this* means, with much Gratitude, being in the full esteem of it? For, what hand or art of *Man* is there in this Operation more than in *bleeding, blistering* and a Score more things in *Medical use?* which are all consistent with a *humble Trust in our Great preserver, and a due Subjection to His All-wise Providence*

Increase Mather.
Cotton Mather.
Benjamin Colman.
Thomas Prince.
John Webb.
William Cooper.

The above communication somewhat modified to meet with the approval of the other signers was written by the Reverend Benjamin Colman, whose original manuscript has been given to the Boston Medical Library by Dr. F. C. Shattuck. Its historical importance is such that Mr. Colman's letter is printed as originally written, at the close of this article.

Dr. Boylston was now a third time called to task[29] and a meeting of the authorities and the selectmen of Boston was held[30] July 21, 1721, "In Relation to the operation called Inoculation lately practiced in this Town by Dr. Boylston of this Place."

The sensational feature of this meeting was the testimony of Dr. Dalhonde who asserted that four out of thirteen soldiers inoculated at Cremona had died, Six recovered with "abundance of Trouble and Care" and three were unaffected. On opening one of the fatal cases the "Diaphragm was found livid, the Glans of the Pancrease tumify'd and the Caul gangreen'd." He stated that he had treated in Flanders a patient with smallpox who claimed to have previously been inoculated five or six times, and whom he believed was incurably lame after his recovery. Of two Muscovite soldiers inoculated in Spain one recovered and the other at the end of six weeks "was seiz'd with a Frenzy, swelled all over his Body, ... his Lungs were found ulcerated, from whence they concluded that it was the Effect of that Corruption which having infected the Limphæ did throw itself upon that Vital Part which occasion'd his sudden Death."

At the same meeting the Practitioners of Physick and Surgery presented the following series of resolutions which were based apparently on the testimony of Dalhonde, and condemned the practice:

It appears by numerous Instances, That it has prov'd the Death of Many Persons soon after the Operation, and brought Distempers upon many others which have in the End prov'd deadly to 'em.

That the natural tendency of infusing such malignant Filth in the Mass of Blood, is to corrupt and putrify it, and if there be not a sufficient Discharge of that Malignity by the Place of Incision, or elsewhere, it lays a Foundation for many dangerous Diseases.

That the Operation tends to spread and continue the Infection in a Place longer than it might otherwise be.

That the continuing of the Operation among us is likely to prove of most dangerous Consequence.

According to Dr. Douglass[31] the Selectmen accepted this view and forbade further inoculation, but Dr. Boylston persisted "in *Contempt* of the Magistrates and in Contradiction to the Practitioners." Dr. Dalhonde's letter was published and aroused anew the fears and wrath of the people, many of whom were in a state of terror lest the disease should be extended through the community by inoculation. According to Cotton Mather,[32] "A Satanic fury raged, the town was still possessed with the Devil" and the writer was vilely abused "for nothing but instructing our base Physicians how to save many precious Lives." The Reverend Peter Thacher states:[33] "It is not many weeks since the author of this account was informed by one of his [Dr. Boylston] childrens (three of whom are still living) of the expression of pious calmness and trust in God, which he was wont to drop when his family trembled at his leaving his house, for fear that he should be sacrificed to popular fury, and never visit it again." For a fortnight no further inoculations were made, and then they were resumed to be continued in increasing numbers till the end of the epidemic.

Cotton Mather writes:[34]

G. D.—Full of Distress about Sammy. He begs to have his Life Saved, by Receiving the *Small-Pox*, in the way of *Inoculation*, whereof our Neighbourhood has had no less than Ten Remarkable Experiments; and if he should after all dy by receiving it in the Common way, how can I answer it? On the other Side, our People, who have Satan remarkably filling their Hearts and

[29] An Historical *Account* of the *Small-Pox Inoculated* in *New England*, Upon all Sorts of Persons, *Whites Blacks* and of all Ages and Constitutions. With Some account of the Nature of the Infection in the Natural and Inoculated Way, and their different effect on Human Bodies. With some *Short Direction* to the *Unexperienced* in this Method of Practice. Humbly dedicated to her Royal Highness the Princess of Wales by *Zabdiel* Boylston, Physician. London. MDCCXXVI, 61.

[30] See Appendix to the Historical Account.

[31] The *Abuses* and *Scandals*, etc., 9.

[32] MS. Diary, July 27, 1721.

[33] Loc. cit.

[34] MS. Diary, Aug. 1.

their Tongues, will go on with infinite Prejudices against me and my Ministry, if I suffer this Operation upon the Child: And be sure, if he should happen to miscarry under it, my Condition would be insupportable.

His Grandfather advises, That I keep the whole Proceeding private, and that I bring the Lad into this Method of Safety.

August 15. G. D. My dear *Sammy*, is now under the Operation of receiving the *Small-Pox* in the way of Transplantation. The Success of the Experiment among my Neighbours, as well as abroad in the World, and the urgent calls of his Grandfather for it, have made me think, that I could not answer it unto God, if I neglected it. At this critical Time, how much is all Piety to be press'd upon the Child!

And it may be hoped, with the more of Efficacy, because his dearest Companion (and his Chamber-fellow at the Colledge) dies this Day, of the Small-pox taken in the common Way.

The opponents of inoculation now found a newspaper devoted to their interests. This was the *New England Courant*, published and sold by James Franklin, which first appeared on the 17th of August, 1721. The *News-Letter* of Aug. 21-28, 1721, No. 917, contains a communication to its author signed by "*Your Friends and Well Wishers to Our Country and all Good Men.*" In it the Courant is characterized as

Notorious, Scandalous, full freighted with Nonsense, Unmannerliness, Railery, Prophaneness, Immorality, Arrogancy, Calumnies, Lyes, Contradictions and what not, all tending to Quarrels and Divisions and to Debauch and Corrupt the Minds and Manners of New England. And what likewise troubles us is, That it goes Currant among the People, that the Practitioners of Physick in Boston, who exert themselves in discovering the Evil of Inoculation and its Tendencies (several of whom we know to be Gentlemen by Birth, Learning, Education, Probity and good Manners that abhors any ill Action) are said, esteem'd and reputed to be the Authors of that Flagicious and wicked paper.

James Franklin, the editor and printer, soon came to grief, however, through his published criticisms of the government and was imprisoned. Zabdiel Boylston certified[55] to his illness while in the jail and Benjamin Franklin, nominally, continued the publication of the paper.

Despite the opposition of Dr. Douglass and most, if not all, of the practitioners and of the town authorities, inoculation was continued. Dr. Boylston was supported in his action by the leading clergymen of the town who wrote articles and pamphlets, "tracts" in its favor. Some of them saw his patients and advised their parishioners to undergo the operation and were themselves inoculated. Six of his own children, his brother and his sister-in-law were thus treated.

The General Assembly now transferred its place of meeting to the George Tavern at the outskirts of the town near Roxbury, and, August 26, 1721, stationed guards at the doorway to prevent the entrance of any but authorized persons from the infected region.[56]

According to Cotton Mather:[57] "The Town has become almost an Hell upon Earth, a City full of Lies, and Murders, and Blasphemies, as far as Wishes and Speeches can render it so; Satan seems to take a strange Possession of it in the epidemic Rage, against that notable and powerful and Successful way of saving the Lives of People from the Dangers of the *Small-Pox.*"

As the epidemic increased in severity so did the number of those inoculated. The better educated and more intelligent were in favor of the method, but the people at large were in violent opposition and objected to the advice of the ministers. In the *Gazette* of October 23-30, 1721, No. 101, there appeared what may be regarded as a report of progress by one, evidently Dr. Boylston, familiar with the conditions.

I. The Operation within these four Months past has been undergone by more than Three score Persons, Among which there have been *Old & Young; Strong* and *Weak; Male* and *Female; White & Black;* Many *serious* and *vertuous* People; some the Children of Eminent Persons among us. II. . . . . Only One Gentlewoman so circumstanced died; But her nearest Friends and all that knew her Case, do firmly believe the *Transplantation* was not the least occasion of it. *Of the rest, the following Account.* III. Of all the Number that have passed under the Operation, there has *Not so much as One miscarried.* It has done well *in all:* and even beyond Expectation in the most of them. IV. Some few have had a considerable Number of Pustules . . . . V. But the most by far, have endured in a manner *nothing.* Their *Pustules,* have been very few. From the time of the *Incision* to the time of their *Decumbiture,* (six or seven days) they have gone about their Business as at other times. After they began, and when they felt the Eruption coming on, they Satt up, and Read and Walk'd; and would have yet more expos'd themselves, if the Physician had not confined them. And they got abroad again sooner than what is ordinary for the Infected in the *Common Way* . . . . VII. The Patients return to their *perfect Health immediately;* and suppose themselves rather better than they were before the Operation . . . . VIII. Some of them have had nothing but a *Cabbage-Leaf* from first to last applied unto them. IX. Some, of whom the People have confidently affirmed *That they died under the Inoculation,* have sent their dying Charges unto their Friends, *To hasten into it.* These friends have done it; and so found their Account in it, and seen such *Easy Circumstances,* that the surviving Relatives of the Deceased are drowned in Tears, to think how the *Lives of Theirs* have been thrown away.

Nevertheless, the leaders in the opposition to inoculation continued to seek by legislation what the terrorizing of the mob could not effect. Apparently there was doubt whether protective measures against smallpox could be carried so far as to exclude inoculation. According to an Act in the time of William III the selectmen were empowered to remove patients with smallpox and place them in a special house. This had been established at Spectacle Island. Consequently, a town meeting was held November 4, 1721, and it was

Voted[58] that whosoever shal come into this Town of Boston from any other Town Presumpteously, to bring the Smal Pox on him or her selfe, or be Inoculated, Shal be forthwith Sent to the Hospital or pest house, unles they See cause to depart to their own home, or if any Person be found in Town under that operation, which may be an Occasion of Continuing a malignant Infection, and Increasing it, among us, that they be Remoued Immediately Least by alowing this practis the Town be made an Hospital for that which may prove worse than the Smal pox, which has already put So many into Mourning, And that the Justices and Select men be desired to put the Method abouesaid in practis, without Delay as the Law Directs.

[55] Province Laws, 1722, X, 174.
[56] Province Laws, 1721, X, 105.
[57] MS. Diary, Aug. 24.
[58] Town Records, 1721, 159.

The Selectmen took early action, as it is recorded [39] November 13, 1721, that

being Credably Informed that divers Persons belongin to other Towns are already come into this Town, and haue taken the Infection of the Smal pox, in the way of Inocculation, but that as yet the Infection has not Operated upon them yet Expect that in a few dayes it will, and that Divers others belonging to Other Towns, Intend to Come to this Town for the Purpose aforesaid, and that they know how to come in and where, and what Houses to use in Spite of the Town. And the Remoueing the Said Persons by Law being Impracticable but by Warrant from Some of his Majesties Justies of the Peace.

The Said Select men Therefore doe hereby give notice to the Justices of this Town of the afore said Practice and pray that they will Isue forth their Warrants to search for such persons as have or are to come for such purposes and remove them to their respective houses or to the province hospital.

Cotton Mather, however, though noting in his diary, November 3, 1721, the "Malicious and Murderous Manner" of the treatment received by him and despite, November 9, 1721, "the Sottish Errors, and cursed Clamours, that fill the Town and Country, raging against the astonishing Success of the *Small-Pox* Inoculated;" takes into his house his nephew, Mr. Walter, of Roxbury, for the purpose of being inoculated. While the latter was lying sick in his room, November 14, 1721, a lighted grenade intended for his host was thrown through the window, but the fuse became detached and burned itself out. On a paper attached to the fuse, according to the advertisement of Cotton Mather in the *News-Letter*, November 13-20, 1721, No. 929, were the words: "COTTON MATHER, *I was once one of your Meeting;* But the *Cursed Lye you* told of ..... You know who; *made me leave* You, You Dog, And *Damn* You, I will Enoculate you *with this, with a Pox to You.*"

In Cotton Mather's diary [40] it is stated that "the *Granado* was charged, the upper part with dried Powder, the lower Part with a Mixture of Oil of Turpentine and Powder and what else I know not," and the sentence referring to the lie is not included. Hutchinson [41] who saw the grenade states that it did not contain powder but was filled with brimstone and bitumen. Although most writers in referring to this incident assume that the violence was due to Cotton Mather's efforts in favor of inoculation, the phrasing of the note in the "advertisement" suggests that the grievance was more specific and personal. Cotton Mather, however, writes: [42] "The Opposition to it has been carried on with senseless Ignorance and raging Wickedness. But the growing Triumphs of Truth over it throw a possessed people into a Fury, which will probably cost me my Life. I have Proofs, that there are people who Approve and Applaud the Action of Tuesday Morning: and who give out Words, that tho' the First Blow miscarried, there will quickly come Another that Shall doe the Business more effectually." He considers [43] himself as "Being in daily Hazard of Death from a Bloody People." It is possible that this incident of the grenade is the source of the previously mentioned statement that one was thrown into Dr. Boylston's house.

The report of progress above mentioned was followed in the course of a month by the communication of the Reverend Benjamin Colman [44] to the same effect. He visited the sick and saw that

they *found ease* and *sweetness* and lay *praising* God on their *Beds* or rather sat up in their Chairs doing so. Their friends stood smiling about them. Their tongues were filled with laughter and ours with Thanksgiving on their account when we went to see 'em .... We saw *scores* thus recover, even as many as went into the happy practice .... They were as discreet and religious a number of People, and Persons of as good sense and understanding, and of as much caution and fear as their Nei'bors, who made these Experiments; and they did it with meekness and humility, patience and silence, and many prayers, under much provocation from too many .....

The distemper was now extended to Cambridge and Dr. Boylston inoculated a number of the students and two of the instructors. The General Assembly had been sitting in Cambridge since November 7, 1721, having been adjourned to this town on account of the epidemic in Boston, and Governor Shute, therefore, had asked for a short session. In the course of a few weeks, however, one of the Boston members died of smallpox. It was supposed that he had become infected through the Speaker, Dr. Clark, who was the leading physician of Boston and in active practice. The Assembly immediately adjourned and did not meet again until the following spring when the epidemic had ceased.

The custom of inoculating, urged as a duty by the leading citizens, ministers and magistrates, who offered examples in themselves and in their families, now became definitely established and ceased only with the disappearance of the disease.

During its course Dr. Boylston had inoculated 244 persons, and Dr. Thompson had inoculated 25 in Cambridge and Dr. Roby 11 in Roxbury. Dr. Boylston had inoculated 10 patients in Charlestown, but was so busy in Boston and Roxbury that he could see them but once. The *Courant* states: [45] "We hear 104 Persons have had the Small Pox inoculated upon them at Roxbury." Of the 280 inoculated persons only six died, a mortality of one in forty-six, in contrast to one in six or seven of those who had become diseased through contagion.

Reports now were received from London of the introduction of inoculation into England. The *News-Letter* of October 16-23, 1721, published as news from London that

A Representation has been made to his Majesty, by some Physicians, that the Small-pox may be communicated, and with great Success, by Incision or Inoculating, as 'tis commonly term'd, as might be experienc'd, if some proper Objects to practice on were found out. And we are assured that two of the condemned Prisoners, now in Newgate, have offered themselves to undergo the Experiment, upon Condition of receiving his Majesty's most gracious Pardon.

In the *Gazette* of October 23-30, 1721, it was announced that the eruption had appeared on some of the inoculated prisoners.

[39] Selectmen's Minutes, 1721, 90.
[40] MS. Diary, 14 Nov., 1721.
[41] Op. cit., II, 249.
[42] MS. Diary, 19 Nov., 1721.
[43] MS. Diary, 24 Nov., 1721.
[44] Some *Observations on The New Method*, etc., op. cit., 3.
[45] *Courant*, Dec. 5-Jan 1, 1721-2, No. 22.

The effect of these experiments is made apparent by the following quotation[46] from the *London Mercury* of September 16, 1721: "Great Numbers of Persons in the City and in the Suburbs are under the Inoculation of the Small Pox. Among the rest the oldest Son of a Noble Duke in Hanover Square."

Increase Mather published[47] an account of the communication of Dr. Walter Harris of London with regard to the inoculation of small-pox. In this is an abstract of the communication of Timoni and a statement of the inoculation of the children of the Hon. Wortley Montague. The *News-Letter* of March 5-12, 1722, No. 945, reports from the *St. James's Evening Post*, August 17, 1721, the letters of Timoni and of Pylarini as printed in the Philosophical Transactions and which Dr. Douglass had refused to show even to the Lieutenant Governor after they had been returned by Cotton Mather. Mr. Campbell, the publisher of the *News-Letter*, adds a note to the effect that a copy of these letters had been in his possession for five months.

The epidemic had now come to an end and Dr. Boylston's efforts met with a deserved recognition from Isaac Greenwood, afterwards Professor of Natural Philosophy in Harvard College. He published, February 25, 1721, 2, a pamphlet entitled, "A Friendly Debate; or a DIALOGUE between ACADEMICUS and SAWNY & MUNDUNGUS, Two Eminent PHYSICIANS, about Some of their Late PERFORMANCES." This he dedicated as follows:

To my very Worthy Physician, Mr. ZABDIEL BOYLSTON.
Sir,

I know no Person so proper, to present the following Dialogue to as your Self.

Such has been your undaunted Resolution, and truly Heroic Courage, thro' the whole Course of your dangerous Enterprize; and such Your Conduct and Wisdom, as merit our highest Regards, and most public Thanks. To *You* under the Auspicious Providence of GOD, we are Indebted for the Blessing of INOCULATION; for you can claim the undivided Honour of Introducing it among us. And hadst not thou began it, perhaps, there would not have been found a Soul so truly great, as to have undertaken it. For this, Sir, I am bold to say, Your Name shall be mention'd with Honour, whilst those Physicians, and others, who have signaliz'd themselves by their Malice and opposition to you, shall be otherwise spoken of.

Isolated cases still occurred and the Selectmen found it expedient to make the following proclamation,[48]

14 April, 1722: WHEREAS *sundry Evil-minded Persons have of late Industriously reported in the Country Towns, that the Small Pox is again very brief in this Town, many Persons now Sick of that Distemper, and several lately dead. This is to Certifie that the Report is false & groundless, there being but three Folks now known to have the Small-Pox; . . . . Could the Inventor of such pernicious Lyes be fully discovered it would be of Publick Service. If any Families that have had that Distemper have not already aired their Houses and Bedding. It is Recommended to all such more especially Innholders and those that entertain Lodgers, that they would speedily take all proper care, in well airing and cleansing their Houses and Bedding.*

On May 11, 1722, however, Dr. Boylston inoculated six persons and on May 15, 1722, it was voted[49]

that a gard be forthwith Set at the House of Mr Joseph Hubbard, Blacksmith to prevent the Removal of Mr Samll Sewal and Sundry others at Said House without orders and Direction of of the Select men they having bin Inoculated for the Smal Pox.

Voted also that there be a gard Set at the House of Coll John Alford for the Same Reason Mrs Joana Alford being there and having Inoculated.

* * * * * * * * * *

Voted that a message be sent to Coll John Alford (by Doctr Boylston & Constable Titmarsh) to acquaint him that the Select men Doe Assigne Spectakle Island to be [the] place his Sister be forthwith Remoued unto.

At the same meeting a committee was appointed[50] to draw up instructions for the representatives of Boston to present to the Assembly for the purpose of preventing the practice of inoculation in any town or place without the approval of the Selectmen. This vote was passed because there had been dispute whether the law relating to the spreading of smallpox gave full power to the Selectmen to do what was needful to prevent the spreading of any contagious distemper and remove persons who may be infected.

On the same day the Selectmen applied[51] for a warrant to remove Mr. Sewall, his wife, two children and one other of his family who had been inoculated from Mr. Hubbard's house to Spectacle Island, also to remove Joan Alford.

The committee appointed at the town meeting of May 15, 1722, reported[52] three days later:

We also in a Special manner Recomend to your Consideration what Refers to the preventing the Spreading of any Contagious Distemper And whereas the Inoculating or Transplanting of the Smal pox has of late bin practised among us to the Terror of many of the Inhabitants.

We desire you to use your best Endeavor that it may be under a propper Regulation, and not practissed in any Town or place without the approbation of the Select men of Such Town, And in as much as there has bin some late Dispute about the meaning of the Law that Refers to preventing the spreading of the Smal pox, etc., whether the Select men have full power to doe what is needfull to prevent the Spreading of any Contagious distemper and Remoue persons that may be Infected. It is therefore proposed that the Select men of Every Town may be Clothed with full power to obtain the great End & Designe of that Law, which is for the Preservation, Health and Safety, of the Inhabitants.

In the *Courant* of May 14-21, 1722, No. 42, the following notice is inserted:

By the Select-Men of Boston

Whereas it is reported in the Country Towns, That great Numbers are now sick of the Small Pox in Boston, not only in the Common Way, but also that greater Numbers are inoculated for that Distemper, These are therefore to signify That the said Report is false and groundless; for that according to the best

[46] *Courant*, Dec. 25-Jan. 1, 1721 (2), No. 22.

[47] Gazette, Jan. 29-Feb. 5, 1721 (2), No. 115; also, Some further Account from *London* of the *Small-Pox Inoculated*. The Second Edition, 1721 (2).

[48] News-Letter, April 9-16, 1722, No. 950.

[49] Boston Town Records, 1722, 165.

[50] Boston Town Records, 1722, 165.

[51] Selectmen's Minutes, 1722, 97.

[52] Boston Town Records, 1722, 166.

Informations, there are not above three or four now sick in the Town in the Common way; and the Select Men having sent for Dr. Boylstone, he solemnly declared in the publick Town-Meeting, that there were no more than six Persons in Boston under Inoculation of the Small-Pox, and that it was performed on them on *Friday* and *Saturday*, the 11th and 12th Instant; And the said Doctor Boylstone then also did solemnly declare and promise That he would not either directly or indirectly inoculate any Person within said Town for the Future *without License* and Approbation of the Authority of the Town.

Whereupon they may also certify, That the said Six Persons under Inoculation, were by Order of said Select Men, and Warrant from Two Justices of the Peace, immediately sent down to the Hospital on Spectacle Island.

According to Hutchinson,[53] the Representatives passed a bill prohibiting inoculation, but the Council refused to agree to it. It took special action, however, with reference to the inoculated persons at Spectacle Island by ordering,[54]

2 June, 1722. That the persons so Inoculated shall not Come up to the Town of Boston during this present Session of the General Assembly without Leave first obtained.

The simultaneous introduction of inoculation in England, although meeting with decided opposition, was not attended with such excitement and fear as in Boston. At this time Sir Hans Sloane was one of the most distinguished physicians in London. He was President of the Royal College of Physicians, Physician-General to the Army, one of the physicians to Queen Anne and present in her fatal illness. He was also the physician of the Princess Caroline, wife of George II. He had been Secretary to the Royal Society, and it was at his instigation that Pylarini had written the account of inoculation published in the Philosophical Transactions in 1716.

His participation in the introduction of inoculation into England led him to prepare a statement which he intended should be published in 1736, although it was not printed until some twenty years later.[55]

It appears that the Princess Caroline had become interested in the subject on account of the dangerous illness of her daughter whom Dr. Sloane was treating for smallpox, and doubtless had been made acquainted with the communications in the Philosophical Transactions. She knew of the successful inoculation of the Montague children and requested that the experiment might be tried upon some condemned criminals who were to be freed in case of its success. This was done by Mr. Maitland, the surgeon who had inoculated the Montague children. In order to test the protective influence of the inoculation Sir Hans Sloane and Dr. Steigerthal, physician to George I, hired one of the inoculated criminals to act as nurse and bedfellow to a patient with smallpox. Princess Caroline also caused several charity children to be inoculated. The success of these inoculations and of others led the princess to ask Dr. Sloane for his opinion of the expediency of inoculating her daughters. Through his statements to her and to George I, two of her daughters were inoculated,[56] April 19, 1722, by Sergeant-Surgeon Amyand under the direction of Sir Hans Sloane. Two years later two of her sons were inoculated, one in Germany by Mr. Maitland, the other in London by Sergeant-Surgeon Amyand, again under the direction of Sir Hans Sloane.

The progress of inoculation during the epidemic in Boston had been followed in England. The Reverend Mr. Mather sent a statement,[57] dated March 10, 1722, showing the mortality of inoculated smallpox to have been only one in sixty, although at a later period in England there were but two deaths in 182 cases. This contrast led Dr. Jurin, then Secretary of the Royal Society, to consider that the operators in England were more cautious. That this was not the universal opinion appears in an extract from the letter of Dr. Thomas Robie written from Salem, June 4, 1723. In this he states:[58]

We don't as yet See any ill Effects of Inoculation, but the Inoculated are as yet as well, and some of them a great deal better than ever; as for the ill Consequences that have been in England, I can't tell what they may arise from, but I can hardly think they are the genuine effects of Inoculation, but may arise from some previous Disposition to such Distempers as you mention or for want of due Evacuation after Inoculating and too soon healing the places of Incision.

With the diminution in the mortality from smallpox in England came a lessening in the frequency of inoculation, but in 1725 the number of deaths from smallpox in London was 3188, one-eighth of the total mortality,[59] although during this year only 151 persons were inoculated in Great Britain and only 105 persons in the following year.

It was at this time that Zabdiel Boylston spent a year in England. He was then the inoculator with the largest individual experience, although his publications on the subject were but few and brief. It is quite possible that he had been invited to visit England for the purpose of presenting this experience, especially as he had made no further communication since the cessation of the Boston epidemic in 1722. Douglass[60] suggests that he went to England to seek profitable employment as an experienced inoculator on account of lack of business at home. This slur was immediately answered[61] in a communication dated March 3, 1729, 30, in which it is stated that Dr. Boylston, though often asked, refused to inoculate persons while in London.

It is quite probable that Sir Hans Sloane invited him to visit London, certainly he urged him to publish his experience. The latter is made apparent in his preface to the "Historical Account." In this he declares that

Writing is a Talent which, of all Things, I never made any Pretentions to and little thought of giving at this Time the

[53] Op. cit., II, 249.

[54] Province Laws, X, 161.

[55] Phil. Trans., 1755, XLIX, 516.

[56] The *History* of the *Inoculation* of the *Small-Pox* in *Great Britain*, etc. William Woodville, 1796, I, 104.

[57] Phil. Trans., XXXII, 1724, 213.

[58] Phil. Trans., XXXIII, 1726.

[59] Woodville, op. cit., 175.

[60] Dissertation Concerning Inoculation of the Small-Pox, 1730.

[61] A Letter to Doctor Zabdiel Boylston; Occasioned by a late Dissertation Concerning Inoculation; Printed at Boston, MDCCXXX.

Publick an Account of my Practice; but being again importuned thereto, by a great and worthy Physician, and having also receiv'd a Message from a Superior Person that an Account of my Success of inoculating the Small-Pox in New England might be grateful, as being of great use, and beneficial to the Publick, I esteem'd it as the strongest Obligation upon me so to do, and in Compliance to that Command I have done it faithfully. If I had proposed any Advantage to myself, in the Practice here, I should have done it above a Year past, on my Arrival in London, and not now on my return home.

It is surmised that Dr. Boylston first presented his experience to the Royal College of Physicians of which Dr. Sloane was President, or to the Royal Society of which he was made a member in July, 1726, but direct evidence upon this point is lacking. The only published[62] communication made by him to the latter is on "Ambergris in Whales," reference to which and to his love for horses is to be found in a MS. letter in the Massachusetts Historical Society from him to Benjamin Colman, dated London, February 26, 1724, 5.

The "Historical Account" is printed in almost a sumptuous manner as compared with the second edition published in Boston in 1730. Its form suggests that Dr. Boylston's affairs were in a prosperous condition at the time, and additional evidence on this point, as well as of a kindly if not forgiving disposition, is afforded by Ward Nicholas Boylston's statement[63] of his interview with Benjamin Franklin. While near Paris in 1783, Mr. Boylston was introduced to Franklin who said to him,

"I shall ever revere the name of Boylston; Sir, are you of the family of Dr. Zabdiel Boylston of Boston?" to which I replied that he was my great-uncle, "then, Sir, I must tell you I owe everything I now am to him. . . . . When Dr. Boylston was in England, I was there reduced to the greatest distress, a youth without money, friends or counsel. I applied in my extreme distress to him, who supplied me with twenty guineas; and relying on his judgment, I visited him as opportunities offered, and by his fatherly counsels and encouragements I was saved from the abyss of destruction which awaited me, and my future fortune was based upon his parental advice and timely assistance. Sir, I beg you will visit me as often as you find you have leisure while in Paris."

Little remains to be recorded of Dr. Boylston's career subsequent to his return to Boston, which he reached before the end of October, 1726. He resumed his practice, which must have been greatly in demand after his reception in England. Indeed it is called[64] "great in town and country" and "every Practitioner gives him the preference to Douglass in curing disease." The practice of inoculation had become so well established that in the epidemic of 1729-30, imported from Ireland, the Selectmen no longer were urged to remove the inoculated to the pesthouse, but precautions were recommended to protect the inhabitants from those inoculated within the town. The following extract[65] from the Town Records illustrates this change of sentiment. At the town-meeting of March 10, 1729, a petition was presented by some of the inhabitants

That the Town might Consult proper methods for preventing the spreading of the Small Pox by Inoculation.

Since the Date of which Petition a Considerable Number of the Inhabitants within a few days past have bin Inoculated, and Sundry Others are preparing therefore, In Consideration whereof the Town came unto the Following Vote,

That it be Earnestly Recommended to the Inhabitants and Freeholders and in an Especial Manner to Masters of Familyes. That all Proper care be taken That Such Persons as Shall for the Future be Inoculated for the Small Pox do Imediately keep in their Houses First giving notice to the Neighborhood of Such their Designs, And that during the Opperation of the Distemper all proper Methods be taken to prevent it's Spreading. And that they would not come or walke abroad in the Streets, Lanes or Alleys within the Town Until their Incisions are well clensed and Healed: Further that the Practitioners in Physick would give to the Select men or to the Town Clerk, the number of Persons by them Inoculated once a week at least, with an Impartial Account of the Operation on their Several Patients in the Course of their Inoculation.

Of the physicians who originally had opposed inoculation, Dr. Williams[66] entered upon its practice in 1730 "with the utmost caution." Dr. Cutler[67] writes to Dr. Gray of London, May 30 (1730?):

The Small Pox is now overspreading this town and strikes terror into the whole country. The Contagion has proved mortal to many, and has therefore inclined great numbers to venture upon inoculation, which has been attended with great success. I have submitted my wife and seven children and a servant to the practice. The most visible effect of this affliction is to *set us in parties*. The main of the church are against it; and it seems that he is no Churchman or Christian who is for it.

Even Dr. Douglass[68] regarded it as "a considerable improvement in Physick." He states that most of those opposed acknowledge that inoculated smallpox is easier than when the disease is accidentally received, that the former is less fatal and that the symptoms are more favorable. He finds that it is the custom for the practitioners to inoculate when requested, but not to persuade or dissuade the applicant. In the last years of his life he became a more earnest advocate and recognized[69] that

The novel practice of procuring the Small-pox by inoculation, is a very considerable and most beneficial improvement in that article of medical practice . . . . The small-pox received by cuticular incisions has a better chance for life and an easy decumbiture; that is, the small-pox so received is less mortal and generally more favourable, than when received in the accidental or natural way.

[62] Phil. Trans., 1726, XXXIII, 193.
[63] N. E. Hist. & Genealog. Reg., 1881, XXXV, 150.
[64] A *Letter* to Doctor *Zabdiel Boylston*, etc., 1730.
[65] Boston Town Records, 1729, 14.
[66] The METHOD of Practice in the SMALL POX with Observations on the Way of Inoculation. Taken from a Manuscript of the late Dr. Nathaniel Williams, etc. Edited by Thomas Prince, MDCCLII, 13.
[67] A Brief Memoir of William Douglass, M. D. By Timothy L. Jennison, M. D., Mass. Med. Soc. Comm., 1834, V, 236.
[68] Dissertation Concerning Inoculation of the Small Pox, MDCCXXXI, 8.
[69] *A Summary*, etc., op. cit., II, 406.

He continues [70] to credit Cotton Mather with no other motive than "the desire for the *imaginary honour* of a new-fangled notion," and his sentiments towards Dr. Boylston remain unchanged. For he adds in a foot note," "This undaunted operator imagined that by going to London with a quackbill of his inoculation performance in New-England, he might acquire a fortune in London; but so it happened, that void of common discretion to couch his ignorance and silly mean assurance, he returned to Boston without being called upon to perform any inoculation."

By way of contrast his friend, Dr. Isaac Watts, writes to Dr. Boylston from Newington in a letter of April 25, 1735, reproduced by Peter Thacher [71] in his memoir, "The inoculation was a glorious and successful retreat, or if you will, a victory over the powers of death in Boston, when it was first practised under your conduct. It has not been so happy among us in England, nor do I find it has been equally happy in New-England since, but the want of conduct in the undertakers, may be are considerable cause of it."

After the publication of the American edition of Bolyston's Historical Account, in 1730, there was no further epidemic of smallpox in Boston until 1752. Douglass relates [72] that

> A ship from London, Capt. Cousins, with the small-pox aboard, was bulged Dec. 24, 1751, in Nahant bay near Boston; the people of Chelsey, the adjacent town, compassionately assisting to save the ship's crew, received the small-pox; about one in four or five died. . . . . It arrived in Boston in January following, by a sailor belonging to the Ship, and got into five or six families, but did not much spread till the twentieth of March, 1752, and Monday the twenty-third, inoculation was let loose; some greedy practitioners indiscriminately inoculated any persons who could be pursuaded to receive it, even pregnant women, puerpeas, old negroes, and the like.

Of the 15,734 residents of the town 1800 fled through fear of the smallpox; of those remaining 7,653 had smallpox; of these 2109 were inoculated.[73] The mortality among those not inoculated was one in ten or eleven, while of the inoculated only one in sixty-eight died. In England under Daniel Sutton and his assistants, between the years 1764 and 1766, nearly 20,000 persons were inoculated with but three deaths and these were not fairly attributable to the inoculation.[75]

Dr. Boylston thus lived long enough to see inoculation well-established and successful and to know that he was recognized as one of the world's benefactors.

Dr. Thomas Boylston, the father of Zabdiel, owned a homestead of ninety-six acres in Brookline which after his death was deeded and sold to Peter Boylston by his brothers and sister. About the year 1736, Dr. Zabdiel Boylston, who is said to have accumulated a handsome fortune, bought the homestead of his brother Peter, who removed to Boston and opened a shop.[76] After purchasing the homestead, he built the mansion still standing in excellent preservation and now the residence of Mr. George Lee. In 1741 his brother Peter's pew was transferred to him, and in 1744 he voted at a town meeting in Brookline. It is known that he continued to practise medicine until he was over seventy years of age, for among the MSS. of the Boston Public Library is a certificate which Zabdiel Boylston of Boston gave to Thomas Fleet in November, 1752, to the effect that the physical disability of the latter was such as to prevent his being exposed as a watchman in bad weather. This library also possesses a receipt from him for medicines and attendance dated Boston, April 23, 1753. It is probable that Dr. Boylston resided continuously or interruptedly in Brookline during this period, but eventually he retired to his country seat where, according to Peter Thacher, "enfeebled by age and disease he passed his last days in the dignity which ever accompanies those who have acted their part well in life."

Inscribed on his tomb in the old cemetery at Brookline, not far from his boyhood's home, are the words:

> Sacred to the memory of Dr. Zabdiel Boylston, Esq., physician and F. R. S. who first introduced the practice of inoculation into America. Through a life of extensive benevolence, he was always faithful to his word, just in his dealings, affable in his manners, and after a long sickness, in which he was exemplary for his patience and resignation to his Maker, he quitted this mortal life in a just expectation of a happy immortality, March 1, 1766.

The following is the text of the manuscript letter of the Reverend Benjamin Colman in the possession of the Boston Medical Library which seems to have served as the original of that published in the *Boston Gazette* of July 27, 1721, and signed by Increase Mather, Cotton Mather, Benjamin Colman, Thomas Prince, John Webb and William Cooper.

> To the Reverend Mr..... of *Boston*.
>
> Sir, It was a pleasure to me yesterday to hear you express the Sense you have of the unworthy Treatment which Dr. *Boylston* has received this week in the *Boston News-Letter*. The angry & contemptuous Letter there is below the Learning & Worth of the *Gentleman* who is said to write it. It breathes nothing of that native Modesty & Meekness which adorns Dr. *Douglass*, nor discovers that purity of Style & Diction which one wd expect from his Erudition. Besides, He has met with so kind & cordial an Esteem in the Town, as were enof to subdue the heart of a rough & unpolished Stranger (the Reverse whereof he is) to ye most humane & placid treatment of every body belonging to it. I Entirely dismiss ye tho't therefore that one of his Silence & Civility is capable of this sudden & angry Effort against a *Son* of the Town, whom Heaven (he knows & we all know) has adorn'd with some very peculiar Gifts for the Service of his country, & has signally own'd in the Success which he has had.
>
> If Dr. *Boylston* was too suddenly giving into a new practice & dangerous Experiment & and also was too confidant of the Innocence & Safety of ye Method & of the benefit wch the Public would reap thereby; altho' in that case we are highly obliged to any learned & judicious Person who kindly informs us of the hazard & warns against the Practice; yet what need is there any injurious words, or mean detracting from the known worth of the

[70] *Summary*, etc., II, p. 409.
[71] *Summary*, etc., p. 409.
[72] Loc. cit.
[73] *Summary*, etc., II, 347.
[74] Selectmen's Minutes, 1752, 283.
[75] The Practice of Inoculation Justified, A Sermon by Robert Houlton, M. A., Chaplain to the Earl of Dorchester and officiating Clergyman of Mr. Sutton's. Essex, 3d Ed., 1767.
[76] Selectmen's Minutes, July 7, 1737.

Doctor? Especially how worthy & unjust (to say no worse) is it to attempt to turn *that* to his reproach which has been & is a singular honour to him & felicity to his Country? I mean those words in the Letter—*a certain Cutter for the Stone.* Yes, thanks be to God that we have such a *One* among us, & that so many poor Miserables have already found the benefit of his gentle & Dextrous Hand. We that have stood by & seen his tenderness, courage & skill in that hazardous Operation cannot enof value ye Man & give praise to God. And I could easily speak of other Cases of equal hazard, wherein the Doctor has served with such Successes, as must render him Inestimable to them yt. have been snatch'd from the jaws of Death by his happy hand.

I blame the Letter for gross *partiality* wch treats Dr. *Boylston* with so severe a Surmise as to say, that he understood the matter of Inoculating *without a serious tho't;* when at ye same time it has the goodness to suppose of another *Doctor*, a *Divine* among us (who push'd on ye Attempt & openly rejoiced in it) that he acted *out of a pious & charitable design of doing good.* I verily believe Dr. *Mather* did so, & why should I not hope the same of Dr. *Boylston?* Is it that a Dr. in *Physic* or a Master in *Surgery* is not capable of the like pious & charitable design with a Dr. in *Divinity?* I am sure I ought to judge ye *best* of my Nei'bours, designs, & *who art thou to forget another?* Well, but this *Boylston is Illiterate*, says the Letter; that is to say, He has not had ye Advantages of a Liberal Education, which Dr. *Clark*, Dr. *Williams* & Dr. *Douglass* have had. He ought to vail to them therefore on that account & congratulate them their Advantage. But must he be therefore called *ignorant & quack?* as the Letter rudely calls him: Would ye Town bear that Dr. *Cutler* & Dr. *Davis* should be so treated? No more can it endure to see *Boylston* thus spit at.

The *Town* knows & so does ye *Country* how *long* & with what *Success* Dr. *Boylston* has practis'd both in *Physic & Surgery;* & tho' he has not ye *Letters* of some Physicians in the Town, yet he has been so happy as to have had more *practice* it may be than any one, Dr. *Clark* excepted: Nor has it been without considerable Study, expence in *Travel*, a good *Genius*, diligent application & a great deal of observation, that he has attain'd unto that knowledge & successful practice wch he has to give thanks unto God for; & wherein I pray God that he may improve & grow with all humility. Then he would not fear want of Business, nor I trust of Usefulness & Esteem: for there are but too many likely to need him, even in Cases wherein none beside him can as yet equally serve.

This I have said in Justice & friendship, as to Dr. *Boylston* & his numerous *Family* to whom I ought to wish well, as likewise unto *Others* among us who have gone into favourable opinion of *Inoculating the Smal pox*, among whom I acknowledge my self to be One: But if it be an *evil & dangerous Method*, as the other *Physicians* of ye Town (to whom we owe great honour & regard) have declared it to be in their Judgment, They have done well to warn the people ag't. running into it: & for my own part I now give the *Gentlemen* my Thanks for the *Resolve* which they have lately published for this end.

The meanwhile I heartily wish Men would treat one another with *decency & charity*, meekness & humility, as becomes fallible Creatures & hearty friends to one another & to their Country; that so our prayers may be more united in this Day of common distress to ye. God of our *Health*, who is ye. *God of love & peace.*

Postscript

As to the *Case of Conscience* referred to the *Divines* in the *Letter* wch I have been Animadverting on, I suppose there never was the like put before to *any.* Wt. *heathens* must they be to whom *this* can be a question. *Whether the trusting more the extra groundless Machinations of men than our Preserver in the ordinary course of Nature, may be consistent with that Devotion & Subjection we owe to the Alwise Providence of God almighty,* who knows not the profanity & impiety of trusting in Men or Means more than in GOD; be they the most learned men, or ye most proper means? But I will suppose *Men of piety & learning* too, (for Instance Such as Dr. *Mather* & Mr. *Webb*, who are opposite *Names* in the present case) after much curious Tho't come into an opinion of the Safety of the saulted method of *Inoculating* the *Smal Pox;* & being persuaded yt. it may be a means of preserving a multitude of lives, they accept it with all Thankfulness & Joy as the gracious Discovery of a kind *Providence* to Mankind for that end; And then I ask—cannot they give into the method or practice without having *their Devotion & Subjection to ye all-wise Providence of GOD Almighty call'd in question?* Must they needs *trust more in men than in their* Great *Preserver* in the use of *this* means than in using other means? What wild kind of *Supposition* is this? Do we not in the use of any Means depend on GOD's blessing? & *live* by that alone? & can't a devout heart depend on GOD in the use of *this* means, with infinite gratitude, being in the full Esteem thereof? What hand or art of *Man* is there in this Operation, more than in bleeding, blistering, & a score more things in *Medical use*, which are all well consistent with a *humble Trust in our great Preserver, & a due Subjection to his all-wise Providence?*

Benjamin Colman.

Boston, July, 25, 1721.

HENRY NEWELL MARTIN,

*Professor of Biology in Johns Hopkins University, 1876-1893.**

By HENRY SEWALL, M. D., Denver, Col.

The name I wish to introduce to you is that of Henry Newell Martin, M. A., M. D., D. Sc., F. R. S., Professor of Biology in Johns Hopkins University from its foundation in 1876 to the time of his resignation in 1893, a period of seventeen years. It may fairly be inquired why, with the exhaustless material at my disposal, I have settled on this one life for exposition. For Martin never for one moment was included by any who knew him within that eerie group possessing attributes we denominate "genius." He was simply an upright, high-minded man with human foibles; he had sound common sense and much tact at his disposal. He possessed no very extraordinary talent or learning. Trained under Sharpey and Huxley and Michael Foster, the truths of nature were the canons of his religion and this education was not only assimilated in the development of his own character but was through him an efficient epoch-making force in the scientific development of our country. It is, I think, worth while enquiring how a young man entering at the age of twenty-eight, without the foundation of experience, upon an academic position whose ideals from the outset departed radically from any that had been hitherto aimed at in the pedagogic history of America,

* Read before the Denver Medical-History Club, Feb. 16, 1911.

had, as I believe, come to deserve the foremost niche in the temple of American physiology which, I venture to hold, is the fountain head of American medicine. In 1876 there was no real profession of either physiology or pathology in the United States. Ambitious young medical graduates got their first hold on medical faculties by undertaking the instruction of students in the perfunctory study of the merely tolerated, if not despised, unpractical or "scientific" bases of clinical diagnosis and treatment—physiology and pathology. Splendid and brilliant men there were scattered about the country and associated with institutions of learning, medical and academic, but their pedagogic relations were limited to the teaching of students. In those days knowledge in America was chiefly founded on authority, not on individual research. True enough, certain original spirits, like Weir Mitchell, H. C. Wood, O. W. Holmes, the Bowditches and many others known to fame, broke through the restraints of convention and lifted here and there a torch to inflame the mind. But the prosecution of original research requires a devoted union of aggressiveness, patience, courage and self-denial which rarely thrives in isolation. It must be surmised that in those days and long preceding, countless pregnant thoughts had sprung up in fertile minds to bloom and fade and die without bearing fruit.

What the Johns Hopkins University did for science and what its Biological Departments did for Medicine was to offer a culture medium and an incubator for scientific ambitions and ideas. Here young men were invited to study and engage in original research under the direction of those who themselves were skilled investigators and amid the stimulating companionship of contemporaries whose talents had already marked them as leaders for the future.

The progress of biological science and art for the past quarter century in this country has sufficiently attested the extraordinary potential energy of the conceptions put in operation at the Johns Hopkins University in 1876. Today there is an American medical science which in my opinion has been made possible only through that massed play of endeavor which in another field Napoleon used to win his victories and a conception of which led Bismarck to make a nation out of futile single states. In short, to employ the vernacular, Newell Martin was the pioneer professional coach in scientific medical team work in America.

Let it be noted that I use the word "Medical" in its profound, most modern significance as that which indicates a conception of vital processes *per se* and which takes it altogether away from that narrow view whose vista was limited by a pill and bound on either side by a saw and an amputating knife. In Martin's time the leaders of thought in physiology felt themselves confronted with a calamity which endangered the autonomy of their science. Physiology in this country did not exist as a profession. Its reason for existence in the mind of even the educated public rested on its relation to medical instruction and it held somewhat the same position in the technical curriculum as grammar does in the academic course. Martin, following the lead of his scientific forebears, insisted that physiology should be regarded as the benefactor not the handmaid of Medicine and that it should be cultivated as a pure science absolutely independent of any so-called practical affiliation. Possibly this question has not yet burned itself out and certainly it is not expedient here to rake the embers, but I must vent the impression that the course of evolution has ordered it that whereas physiology was then the dependent runt of the medical family it is today the eldest son in a stable system of primogeniture. As with a noble jewel whose beauty depends upon the cutting, we may name one facet Pathology, another Pharmacology, another Bio-chemistry, another Psychology, and so on, the jewel itself remains and ever will be Physiology.

I will quote bodily from an obituary notice of Martin contributed by Sir Michael Foster to Volume 60 of the *Proceedings of the Royal Society*. It is as follows:

Henry Newell Martin was born on July 1, 1848, at Newry, County Down, Ireland. He was the eldest of a family of twelve, his father being at the time a Congregational minister, but afterwards becoming a schoolmaster. Both his parents were Irish, his father coming from the South of Ireland and his mother from the North. He received his early education chiefly at home, for though he went to several schools, his stay was not long at any one of them. Having matriculated at the University of London before he was fully sixteen years of age (an exemption as to age being made in his favor), he became apprentice to Dr. McDonagh, in the Hampstead Road, London, in the neighborhood of University College, on the understanding that the performance of the services which might be required of him as apprentice should not prevent his attending the teaching at the Medical School of the College and the practice in the Hospital. During his career at University College he greatly distinguished himself, taking several medals and prizes, in spite of his time for study being, on account of the above-mentioned duties, less than that of his fellow students. In 1870 he obtained a scholarship at Christ's College, Cambridge; he had in the summer of that year conducted at Cambridge a class of Histology for the late Sir G. Humphrey. The writer of this notice had at about the same time been appointed Prælector of Physiology at Trinity College, and the two went up to Cambridge together in the October of that year. He at once undertook to act as the demonstrator of the Trinity Prælector, whose right hand he continued to be in every way during the whole of his stay at Cambridge. His energy and talents, and especially his personal qualities, did much to advance and render popular the then growing School of Natural Science in the University.

At that time there was, perhaps, a tendency on the part of the undergraduate to depreciate natural and, especially, biological science and to regard it as something not quite academical. Martin by his bright ways won among his fellows sympathy for his line of study, and showed them, by entering into all their pursuits (he became, for instance, President of the Union and Captain of the Volunteers) that the Natural Science student was in no respect inferior to the others. In Cambridge, as in London, his career was distinguished. He gained the first place in the Natural Science Tripos in 1873, the second place being taken by Francis M. Balfour. At that time the position in the Tripos was determined by the aggregate of marks in all subjects. While at Cambridge he took the B. Sc., and M. B., London, gaining in the former the scholarship in Zoölogy. He proceeded later to the D. Sc., being the first to take that degree in Physiology. So soon as, or even before, he had taken his degree, he began to devote some time to research, though that time, owing to the necessity

under which he lay of making money by teaching, was limited. His first publication was a little paper on the Structure of the Olfactory Membrane which appeared in the Journal of Anatomy and Physiology for 1873. In the summer of 1874 he assisted the Trinity Prælector in introducing into Cambridge the course of elementary Biology, which the late Professor Huxley had initiated at the Royal College of Science during the preceding year. He subsequently acted as Assistant in the same course to Professor Huxley himself. One result of this was that he prepared, under Huxley's supervision, a text-book of the course, which under their names, appeared with the title Practical Biology and which has since been so largely used. In 1874 he was made Fellow of his College, and giving himself up with enthusiasm to the development of natural and especially of biologic science at the University, was looking forward to a Scientific career in England, if not at Cambridge. About that time, however, the Johns Hopkins University at Baltimore was being established, and such was the impression made by Martin upon those with whom he came in contact, among others, Dr. Gilman of Baltimore, that in 1876 he was invited to become the first occupant of the Chair of Biology which had been founded in the Johns Hopkins University.

Martin married in 1879 Mrs. Pegram, the widow of an officer in the Confederate Army, but there was no issue, and in 1892 his wife died. Even before his wife's death his health had begun to give way, and after that he became so increasingly unfitted for his duties, which his own previous exertions had raised to a very great importance, that in 1893 he resigned his post. After his resignation he returned to this country, for he had never become an American citizen, and was looking forward to being able, with improved health, to labor in physiological investigations, either at his old University or elsewhere in England. But it was not to be. Though he seemed at times to be improving, he had more than one severe attack of illness and never regained sufficient strength to set really to work. During the past summer he visibly failed, and while he was striving to recover his strength by a stay in the quiet dales of Yorkshire, a sudden hemorrhage carried him off on October 27, at Burley-in-Wharfedale, Yorkshire.

I do not fear to make my sketch redundant by quotation of other less formal words of the same writer. When in September, 1900, on his return journey after delivering the course of Lane lectures in San Francisco, Sir Michael Foster stopped for a few days in Denver, and the Medical Department of the University of Denver enjoyed the unique privilege of hearing from his own lips an extemporaneous and colloquial review of men and events as recalled from his own scientific career. I have ventured to insist at the outset of this narrative that the establishment of physiology as a profession in the United States was due chiefly to the stimulus given to physiological research and diffusion of physiological instruction by Professor Martin at the Johns Hopkins. And as Martin's knowledge, methods and inspiration were all developed in England it will be interesting to get a glimpse of the status of physiology in that country just antecedent to the time of which I write. To quote from Foster's Denver address:*

Sharpey was the only man at that time (1850) who devoted his whole life to physiology. In all the other schools physiology was taught by practicing physicians and surgeons. . . . . Now Sharpey was at the time I am speaking of the greatest physiologist in England, the only person who devoted his whole time to science, and yet even he taught physiology entirely by lectures. He had no physiological laboratory. He had no physiological apparatus whatever. All he did in the way of practical teaching at that time was to show us under the microscope preparations of the various tissues. There was no attempt whatever at any practical teaching of physiology. I remember very well when he was lecturing on blood pressure, and was describing to us the then new results of Ludwig, endeavoring to explain to us the blood pressure curve, all he had to help him was his cylinder hat, which he put upon the lecture table before him and with his finger traced upon the hat the course of the curve. That was the way that physiology was taught by Sharpey in England in 1854. . . . . Nobody else in England then was teaching physiology as Sharpey taught it and, as I tell you, he used his hat, and a very old hat it was, as a kymographion for blood pressure. I very well remember going to him one day after his lecture, in which he had been speaking of the functions of the liver (by that time he had recognized that I had a special interest in physiology), and he said to me: "Well," he said, "I didn't like to say anything about it in my lecture, but Claude Bernard in Paris has just sent me a paper which he has read before the Academy of Sciences at Paris and in that paper he has proved that there is present in the liver a substance resembling starch, which is easily converted into sugar."

Foster then stated that, having taken his qualifications, he practiced medicine in the country for six years but was then called back to London to teach practical physiology in University College where a subordinate lectureship in that subject had been established under the influence of Sharpey.

That was in the early sixties, in about sixty-four or sixty-five. But what could be done then was very, very little. I had a very small room. I had a few microscopes. But I began to carry out the instruction in a more systematic manner than had been done before. For instance, I made the men prepare the tissues for themselves. That was a new thing in histology. And I also made them do for themselves simple experiments on muscles and nerves and other tissues on live animals. That, I may say, was the beginning of the teaching of practical physiology in England. . . . . These lectures on physiology were absolutely voluntary, and only the better students were willing to give up the time needed to get a more thorough grasp of physiology. Well, I appointed a time to see the few who wished to spend some time in this new study, this study of luxury, and there came to me a boy nothing more than a boy, who said: "I am very sorry, sir; I should like to take your course if I could, but you see my parents are not very well off, and I get my board and lodging by living with a doctor close by. . . . . I have, in return for my board, to dispense all the doctor's medicines, and that dispensing takes me from two to five; now your lectures begin at four. I cannot come for the first hour; I will work hard and will try to make up the lost time." I said "certainly, certainly." So he came in, came in regularly late. He came in regularly at five o'clock, and he worked with such purpose that in the examination which I had at the end of the course I awarded him the prize. Well, his name was Henry Newell Martin, and I was so much struck with him that I asked him to assist me in my course, and he became my demonstrator. After we had been at University College together I think two or three years, Martin carrying on his studies and at the same time helping me, he came one day to me in great trouble because he could not make up his mind. He obtained what they call a scholarship at Christ College at Cambridge and he could not make up his mind to accept it and go there. He said he didn't want to leave me. But I was able to tell him what nobody else knew at that time, that in the October in which his scholarship would take him to

* *Vid. Colorado Medical Journal*, Oct., 1900.

Cambridge I was going to Cambridge too, having been invited to lecture there. . . . And after a career of considerable brilliancy of some years at Cambridge there came to him an invitation to the Johns Hopkins University at Baltimore. So if I have done nothing more, at all events I sent Henry Newell Martin to America.

It was one of those chances which determine the course of human life by which it happened that the writer of this article, a native of Baltimore, graduated at the age of twenty-one from a New England College some three months before the inauguration of Johns Hopkins University. Through the kindly offices of that sweet and gentle character, Dr. James Carey Thomas, a member of the original Board of Trustees of the University, an introduction was secured to Professor Martin, whose sufficient distinction it was to have been an associate of Huxley, that grand Napoleon of biologic science, who had already enthralled the youth of two continents. I called on Professor Martin at his rooms and my spirits were lightened when I saw a very young man, he was then twenty-eight and looked younger, who treated me at once something like a companion. He was scarcely of medium height, of slight but well-developed frame. His head was rather small, the eyes blue and wide open, nose thin and fine, complexion fair and mustache blond. His dress was always strikingly neat without being foppish. I cannot but fancy that Martin then was homesick and keen to relish the devotion of one not far from his own age. Martin accepted me as his assistant in the biological laboratory at a stipend of $250 for the first six months. Not for many months did I suspect that this was at first a private and not a University appointment.

Martin's ability as a teacher is attested by the eminence of many pupils; his talent as an investigator is recorded in the literature of physiology; but the personality of the man, the kindly tact, the sincerity, the loyalty to truth and the indefinable emanation that reaches from man to man, the memory of these is apt to fail with the heartbeats of his companions. I well remember the first week of preparation for class work. There was as yet no laboratory "Diener" and a hundred tasks of household preparation were to be completed in advance. Martin was kinder than he could have known when he stood beside his assistant washing bottles for reagents; and in this, as in every other field, what would have sorely hurt as a menial service he turned into the routine of technical manipulation.

While he never gave way to sentimentality, his invariable kindliness where he had bestowed confidence withstood every strain of daily intercourse. On one occasion he loaned me overnight the manuscript of an important public address which was to be published. Next morning the roll was missing and apparently lost beyond repair, but the delinquent was the only one ruffled by the accident. To his great joy the papers were found to have been left on the counter of a friendly shopkeeper. For one of his public lectures before a fashionable, and chiefly feminine, audience plans had been devised for the demonstration on the projection screen of familiar physiological activities such as muscular contraction, reflex action and the heart beat in the frog. My business was to prepare the tissues and make them work. Unfortunately the apparatus was not available for proper rehearsal and when the fateful hour came, the nerves and muscles rebelled at the "lime light." Martin would graphically describe a function and then call for demonstration. Again and again I failed him and things looked desperate, when he asked in the gloom of turned down light and with accents between a sob and a groan, "Sewall, is your heart going?" Humiliation was relieved by the titter that restored the humor of that fair audience.

A lecturer might well feel murderous towards an assistant who so failed him, but if Martin felt that way he gave no sign.

Leading women of that day seemed more interested in general culture than in politics. For a considerable period Martin made weekly visits to New York to talk biology before a woman's club of exclusive personnel. In this and similar ways not only was scientific instruction of the right sort widely diffused but individual sympathy with scientific aims and methods was infused into social and civic leaders of various communities. It may easily be surmised that the present annoying agitation against animal experimentation might lose at least the co-operation of the sane and truthful element of society were scientific teachers generally in the habit of imparting by *viva voce* methods and colloquial intercourse their technical thoughts and aims.

One marvels at the wisdom of those early directors of the University policy. No effort was spared, apparently, to direct, uplift and fulfill the higher ambitions of the people of Baltimore. This people of peculiar sensitiveness, with unmeasured potential power, could have easily been irritated into an antagonistic force against the infant university. But even before the doors were opened and beginning with the public inaugural address by Professor Huxley, the people of Baltimore were taught that this institution was primarily for them and their children. They were made to feel at home in its lecture halls, its class rooms and its laboratories. In this social knitting of fellowship between the University and the community Professor Martin took a leading part. Endowed with social instinct and a cultivated *savoir faire* he was welcomed into the exclusive social circles of the community and early numbered warm friends in the admirable upper stratum of the medical profession of the city. Not until many years after was the medical school of the University opened, and I cannot think but that the preliminary moulding of local medical sentiment by Martin was a powerful stimulus to that valuable and hearty co-operation given by the best element of the profession to the medical school in its early days. The University of Maryland was at that time in fact and tradition the only medical school in Baltimore. Curiously enough, since the establishment of the Johns Hopkins medical department with its unequalled standards, the medical schools of the city have multiplied to the number of eight, few of which have attained qualifications endorsed by the investigating committee of the Carnegie Foundation. Though Martin's special training had been in animal physiology the title of his position was that of Professor of Biology and the first course offered in the laboratory was one

in general biology, following the lines of the textbook by Huxley and Martin. The personnel of the first class was drawn chiefly from the more ambitious students of the University of Maryland and younger graduates of that school. The precious influence of those early days of halting development is attested in the careers of many who there first tested the exultant freedom of scientific thought. Councilman was one of those pupils and often has he eagerly acknowledged his debt to Martin for kindling and shaping his early ambitions. There Booker laboriously laid the foundation for the admirable work he later did. Rivers, now of Denver, was in that earliest class. Later, Sternberg, just winning his spurs in bacteriology, was cordially given the run of the laboratory and there developed some of the essential researches on which his scientific reputation rests. And, incidentally, it may be remarked that, in my belief, the vast uplift which the medical and hygienic standards of the government medical service has witnessed in the past quarter century has been chiefly due to the influence of the biological departments of the Johns Hopkins University, first through the stimulus given by Martin and later by the precious association enjoyed by workers with Welch. There was illustrated the very ideal of pedagogy in which the soul of the teacher combined with the soul of the pupil and charged it with a force which irresistibly impelled to the search for revelation in Nature. It may well be doubted whether without this teaching there would have been as we know them in person or in memory, a Reed, a Carroll, a Gorgas or a Lazear. Without this teaching it is probable that yellow fever would have remained a mysterious miasm and the attempt to trench the continent at Panama would have been a disastrous failure.

In the second or third year of the laboratory young men fresh from college, and with vastly better preliminary training than those from the medical school, began to seek postgraduate instruction. Among these one quiet boy, by virtue of his clear judgment and competent grasp of the problems presented, soon became singled out from the rest of the class as that boon to the teacher, a sort of intellectual reagent by which the efficiency of the instruction might be tested. None of us dreamed that this lad, W. H. Howell, was in training to take up the task which Martin was to relinquish and to keep the physiological laboratory of Johns Hopkins in the forefront of the friendly rivals for whose existence it was largely responsible.

Looking back over the history of those days one must marvel at the felicity with which Martin made and then developed opportunities in the unbroken field before him. Courses in practical biology and practical physiology formed the routine of laboratory work. But soon there were established accessory classes in demonstration and practice. A selected number of the teachers of Baltimore were offered a course of study on Saturday mornings. Listening first to a brief descriptive lecture by the professor, they then adjourned to the laboratory and with their own hands and eyes carried on for two or three hours such a nature study as had not been conceived in those days. It was a duty of the writer to prepare material for that Saturday's class and the obligation fully occupied the spare time of the preceding week. The physicians of the community were invited to a course of physiological demonstrations and many eagerly availed themselves of the opportunity. Martin's unselfish and impelling nature sought the utmost development of all about him. The present writer had no sooner attained a defensible grasp of histological material and technique than he was induced to offer a private course in histology to medical students and was allowed to retain the fees therefor.

Martin soon came to be looked upon as the scientific exponent of the medical profession and through lectures and practical demonstrations he illuminated the minds and raised the ideals of the more ambitious members of the cult. With infinite tact he made abstruse subjects so plain and practical that his hearers often volunteered as real students and helpers. He beguiled a medical audience into a feeling of familiarity with profound subjects and at the end the listeners had actually acquired something.

W. K. Brooks was originally appointed Fellow in the Department of Biology, but at the outset it became apparent that his acquirements and capacity were preeminent and he gradually took over the distinctly zoölogical side of the instruction. Brooks was one of the very few men I have known who seemed to me to be born philosophers. What I understand to be the philosophic method was to him not like a suit of clothes to be left in the class room but was his very skin and indispensable. His viewpoint of all phenomena was such as one might imagine actuated the Genius of Nature itself. A fireside talk with him was almost an intellectual carousal but, withal, leaving one fresher and better satisfied.

After we had been going some four years, the writer having moved on to a Fellowship and then to the post of Associate in Biology, W. T. Sedgwick, newly from Yale, was put in charge of practical instruction. We made a most harmonious team. He confided to me at the outset that he didn't know anything about the subject. I confessed to being in much the same fix but that we wouldn't say anything about it. Sedgwick was gifted with that precious influence, which is the most valuable faculty of the physician in the sick room, the power of diffusing confidence. His calm, critical yet kindly partnership was distinctly to the good of the department. I can hardly doubt that in return, the training he received in Baltimore was the corner stone to that brilliant career upon which he was soon to enter at the Massachusetts Institute of Technology.

Most teachers, perhaps, on leaving the class room or laboratory are glad to shun the faces that duty makes familiar throughout the day, but Professor Martin after his marriage invited pupils to a weekly informal conference at his home where with his talented wife he supplemented the impersonal relations of the laboratory with the ties of social intercourse. The high grade associations which Martin had enjoyed, especially at Cambridge, no less put their stamp on his character than did the unique training in nature study under Huxley and Foster direct the current of his abilities. The absolute

unselfish singleness of purpose of the man to seek the truth in Nature and to be honest with his friends shone clear in every act, though he refrained from ostensibly preaching ethics. We hedge round with a wall of respect the slender group of those who have no private working legend, "What is there in it for me?"

No adequate estimate of the specific educational forces at work in the late seventies can fail to take into account the influence on the youth of that period of the intellectual atmosphere emanating from the doctrine of evolution. The "Descent of Man" appeared in 1871 and soon a strife was on between a protesting and enraged orthodoxy on the one hand and the, often iconoclastic, forces of thought-liberty on the other. Professor Huxley, known affectionately by those near him as the "General," as the commander of a ship is dubbed "the old man," was the splendid and aggressive leader of the Anglo-Saxon believers in evolution. It is not surprising that the internal tempest bred by thoughts of the supernatural in the mind of every thinking youth should have often found its outlet along the channels of reason as suggested by evolution when intolerant of the traditions of mysticism. To be frank, the popular notion that the prevailing spirit of the Johns Hopkins staff in those days, at least as regards the biological department, was "agnostic" was sufficiently correct. A corollary to this attitude could not but occur to me when, with something like a shock, I once heard Martin say in effect, "I am thirty years old today and am ready to quit; have had enough." The corollary is that something more than nature study is necessary to satisfy some of the affinities of man.

To my mind the most useful teaching of Martin's career is found in an analysis of the elements of his success. It was clear in his case, as has often been established in others, that his success depended on careful preparation for every effort made. I was very much impressed when, after two years special study of gastric digestion and he had appointed me to make my maiden lecture on the subject, he asked me a full month before the time whether I had prepared my lecture yet. The thought sprang to mind "It may be that this ultra-preparedness has something to do with Martin's success."

Again, once when we were giving parallel courses to the same class, he in the morning and I in the afternoon, he one day evidently ran out of prepared material and to my horror, being one of the audience, he deliberately appropriated the most harmonious thunder I had laboriously stored for the afternoon. I hastened to privately reproach him on the subject but he only replied "It doesn't matter; it will do them more good to hear it a second time." This reminds one of the summing up which a great teacher, Michael Foster, I think, made of his pedagogic experience: "Every year I put less into my lectures and say it over oftener." I can recall but two personal criticisms Martin ever made to me, one was because of a tendency to neglect to expound familiar and obvious details in making a physiological demonstration and the other was for a proneness to procrastinate the preparation for a remote exposition. Martin found time in 1880 to write an excellent textbook of physiology, "The Human Body," which became very popular in colleges; and in a short time a separate, condensed edition, "The Briefer Course," was prepared for use in secondary schools.

Nothing that I have said predicates for the Johns Hopkins University or its biological department a position of peculiar preeminence among American institutions of learning. Yet it is now a matter of history that to the University was conceded a unique position as an educational leader almost from the opening of its doors. With phenomenal wisdom the administrators of the University chose for the heads of its departments men who were not merely good lecturers but were investigators and sources of inspiration in their respective fields. The three departments of natural science established were all under the direction of men still far short of middle age. In those days the young men gathered there were all votaries of what Huxley called "the divine dipsomania of original research." Of inexpressible value to us, often ill-informed but earnest students, were the precepts and examples of leaders trained in the ways of making knowledge. Martin's achievements inculcated the encouraging lesson that the prime requisite of a successful investigator is not "genius" or even great talent, but above all, a faithful, unerring, insatiable desire for Truth as a point of view; to which must be added a working energy of indomitable persistence and guided by a faith that nothing happens without a reason.

Martin was not a voluminous writer. In his seventeen years of service in Baltimore there were produced by him but fifteen papers covering the results of original researches. Some of the work that Martin accomplished was truly epoch-making by reason of the fact that it led to methods which have been most fruitful in physiological discovery. Yet Martin's name is seldom mentioned in the literature thereof. Verily, in science as in commercial life, the promoter is not without a function to him who would reap from his sowing. Martin knew nothing of mathematics, yet his clear mind grasped the essentially mathematical method of dealing with the complex problems of biology; for he realized the necessity of attacking vital phenomena not *in toto*, as the clinical observer is forced to do, but through a study of the separate variables which combine to produce them. He frequently said, "We know a good deal about the skeletal muscle because we can isolate it and of the frog's heart for the same reason," and his mind evidently kept in view the importance of studying the various vital functions in disassociated organs.

I very well remember one morning, I think it was in the Fall of 1880, Martin said to me, in effect, "I could not sleep last night and the thought came to me that the problem of isolating the mammalian heart might be solved by getting a return circulation through the coronary vessels." The idea seemed reasonable and at the close of the day's work we anæsthetized a dog, prepared him for artificial respiration and then Professor Martin opened the chest and ligatured one by one the venæ cavæ and the aorta in such a way as to leave sufficient amount of blood in the heart itself. The heart con-

tinued to beat in a normal manner, the circuit made by the blood being from the right side, through the lungs to the left side and back through the coronary vessels in the heart wall to the right auricle again. Thus heart and lungs were completely isolated from the rest of the body and could be studied unaffected by the interference of factors foreign to itself. Martin grasped the full significance of his discovery and elaborated with infinite patience the practical details involved in submitting the isolated organ to experimental conditions. It was thought necessary to furnish the heart with an artificial supply of blood and accordingly defibrinated calf's blood was used and fed to the heart from a Mariotte's flask. The body of the dog and all the materials used in the experiment were inclosed within a glass walled hood of ample dimensions movable by ropes and pulleys over a shallow pan of zinc in which water was kept heated at a body temperature. In such an apparatus the isolated heart could be kept beating in a fairly normal fashion for upwards of five hours. The prosecution of such an experiment was exhausting to body and mind, yet for several years Martin lost no opportunity to press his work to a finish. Nothing could be a surer index of the clarity of mind in this investigator than the simple and fundamental data he sought to establish by his new method. We find his first paper entitled, "The Influence on the Pulse Rate of Variations of Arterial Pressure, of Venous Pressure and of Temperature." Again we have "The Direct Influence of Gradual Variations of Temperature upon the Rate of Beat of the Dog's Heart." Also, "The Action of Ethyl Alcohol upon the Dog's Heart," and so on through a series of some nine researches.* The paper upon the effect of temperature upon the heart beat was the subject of the Croonian lecture for 1883, and about this time the author was elected Fellow of the Royal Society.

The great strides which have been made towards a complete knowledge of cardiac physiology and, as an outcome, of clinical cardiac pathology in the past ten or fifteen years, have been made along the path first cleared by Martin. It was not until 1895, fourteen years after Martin's discovery, that Langendorff introduced his admirable and simple method of sustaining the isolated heart by a nutrient stream directed into the coronary vessels alone through a canula tied in the stump of the aorta. It seems little to the credit of physiologists that so long a time should have elapsed before so obvious a modification of Martin's procedure should have suggested itself. Isolation of the mammalian heart by the "Method of Langendorff" is now a common laboratory procedure. Probably few are aware of the real discoverer of the idea.

It is interesting to note the character of the problems with which Martin busied himself, and his persistent search for an *experimentum crucis*. Assisted by Sedgwick he apparently settled experimentally the disputed function of the internal intercostal muscles. They also succeeded in putting a canula in a coronary artery of the living dog's heart and directly measuring the blood pressure and pulse wave in the coronary system, though the great Cohnheim had laid down the dictum that occlusion of a main coronary artery was immediately fatal to the physiological action of the heart.

When one considers the prevision manifested in these researches of a quarter century back one cannot but deplore the loss to science of Martin's mind and wonder whether, with the richer material facts and profounder views of their meaning now current, he might not, if living today, be the acknowledged master in his chosen field. Perhaps, after all, it is only another of Nature's compensations that the story of life should be prone to end in anticlimax. It makes it easier to close the book. Failing in health and energy of application for some years, Martin resigned his professorship in 1893, at an age when he should have been in his prime—45 years. In a letter to me written from a sick room at that time his thought was all for the destiny of that Pure Physiology which he had labored so faithfully to nurture on American soil.

* *Vid.* Memorial Volume, "Physiological Papers," by H. Newell Martin. The Johns Hopkins Press, 1895.

MEDICAL NOTES ON THE DIVINE COMEDY OF DANTE ALIGHIERI.*

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As a physician one cannot, in reading the Divine Comedy, escape being attracted by the frequent medical allusions it contains. It may appear of subordinate interest to attempt to draw from and present by itself its medical lore, and perhaps also imprudent in a physician to express an opinion on Dantean questions which in truth fall not within his sphere. The latter is in no wise my purpose. I have endeavored merely to present in collected form, making no pretense at completeness, such references as I believed might prove of interest in portraying something of the state of medical science in Dante's age and as might serve to shed some light upon his knowledge of medicine. I trust this may have been to no idle purpose.

To secure a finished picture of medicine, especially of ancient and medieval medicine, we are pressed to call upon the historian, philosopher and poet to supply that which the purely medical writers have withheld from us. Thus Homer reveals a wealth of medical information in the Iliad and Odyssey. Plato, the philosopher, wrote also of medical problems. To the historian, Thucydides, we owe the best account we possess of the plague of Athens. The medicine in Shakespeare has been made a subject by many writers. Molière has preserved for us

* All the quotations are taken from Longfellow's translation of the Divine Comedy. I have given it preference over the many others, first, because of the English translations, I believe it to be the one with which the American reader is most familiar, and, second, because, accepting the opinion of those best qualified to judge, his version is recognized as among the best in any tongue, and the most faithful and scholarly which the English language possesses.

phases of the medical life of the seventeenth century. How frequently we find in accounts of the plague of England (1663-65) quotations, describing its ravages, taken from Pepys' Diary. Choosing at random from among more recent writers, let us select George Eliot, who in Middlemarch, seeks to incorporate in Doctor Lydgate the struggles and aspirations of the profession in the nineteenth century, and Oliver Wendell Holmes, in whose purely literary writings, we are given so much of interest and worth drawn from a physician's daily life in his community. But where today can we find the old family doctor he depicts? We would seek in vain through the medical journals for an account of him. In like manner the Divine Comedy—the Mirror of the Middle Ages, as it has been termed—reveals much of medical interest, which deserves recognition, the more so because the medical literature of the Dantean period leaves much to be desired.

The Divine Comedy is an expression of all that the great genius of Dante was master. It is more than a medieval comprehension of dreams of the hereafter, abounding with legends and visions of the world to come. It is the one epic which embodies as no other has done the past and present, time and eternity. One cannot read it carefully without observing how closely, almost exclusively, Dante fixes his observation on human nature. Humanity itself with its faith and erudition, with its presentiments, with its joys and sorrows, peace and repose, with its strifes and toils, and with its virtues and vices is the fertile source of his theme. For that vast gathering of spirits which is introduced to discourse on such varied topics we glean that which the Divine Comedy contains of medical interest. What it portrays of medicine is as Dante and his time knew it.

Whether, if at all, Dante was schooled in the science of medicine remains conjecture. The opinions of his numerous commentators are at variance regarding this, and Dante in his writings has left no positive evidence. The consensus of opinion among his commentators appears to be that in large part his learning was acquired autodidactically and that later in life his eagerness for the acquisition of knowledge led him to pursue university study. His early training was gained in the schools of Florence. In these were taught the trivium and quadrivium, the first including grammar, logic and rhetoric; the second, music, arithmetic, geometry and astronomy. Among the universities, Padua, Bologna, Paris and even Oxford are accredited with having had him enrolled. Be that as it may, we are in total darkness whether or not while in attendance at any one of these institutions, Dante devoted any of his time to the study of medicine. We know that in 1297 he enrolled himself in the guild of physicians and apothecaries, being there qualified with the title "*Poeta.*" His enrolling as a member of a guild was probably done as a necessary preliminary requisite to his entering upon active politics. But why choose the mentioned guild in preference to others? Because among his ancestors were druggists; because Dante intended eventually to pursue medicine as a calling; because apothecaries, in his time, dealt also in books, and Dante was a lover of these; because to this guild belonged also artists, and Dante was a lover of art. These and other reasons are presented on the list of choice.

The "Guild of Doctors and Apothecaries of Florence" was incorporated in the twelfth century. It grew rapidly in importance during the thirteenth and fourteenth centuries, and soon became a very important power in the republic of Florence.

A statute applying to the physicians lays down that, "No doctor may be allowed to practice unless he has first been publicly examined by the consuls of the guild." To apply as an apothecary imposed no examination, as it did for a doctor, and required merely registration. Those engaged in the making and selling of books and other literary matter were members of this guild; so too the painters and engravers. The fact then that Dante enrolled as a member of this guild cannot well be taken as evidence that he devoted himself to the study of medicine in order to qualify as a member. We are told by no less an authority and student of Dante than Kraus, that Dante knew medicine and practiced it as a means of support while in exile. Lowell tells us that "to the trivium and quadrivium Dante afterward added painting, theology and medicine." Whether or not Dante was versed or trained in medicine the fact remains that he did not write as a physician. In attempting to interpret his medical references in the Divine Comedy it is often difficult to discriminate between what shall or shall not be regarded as such. A liberal interpretation must include many things, that are but the expression of a common knowledge held by all men of his time. For a better understanding of what the Divine Comedy contains of medical interest it may not be amiss to recall briefly the state of affairs under which medicine labored in the thirteenth and fourteenth centuries.

All medicine during this period was held fast by the ban of the inexorable idolatry of Galen, and, as did all learning in this period, suffered heavily under clerical, feudal and scholastic conceits. Under the oppression of a ruling despotism and mystical tendencies, a spirit of individual research could not flourish, and the men of medicine were known less by the merit of their works than by their love for instructing and the zeal they displayed in the propagation of such knowledge as they had borrowed from the ancients. However, the Arabic versions of Greek medicine had been rendered into Latin from the books of Rhazes, Albucasis, Avicenna and others, and this gave a worthy impulse to medical progress. The schools of Salerno, Bologna, Padua, Montpellier and Paris, as liberal institutions of learning, had reached and were advancing to a reputable height. But philosophy which was most ardently pursued at these institutions held medicine wrapt in its cloak, permitting it to become little more than a philosophical science. It tended on the one hand toward Galenism, on the other it conformed with the Arabic system or again strove along some new and untrodden medico-philosophical path. Under the heads of these various systems all observations were recorded blindly. That conditions such as these could produce but few real medical writers worthy to arrest our attention is clearly evident. Besides the universities, the cloisters were also seats

of medical learning. The Benedictines in particular occupied themselves much with medicine and even gave themselves to the practice of surgery, though frequently against the wishes of their superiors. Those who taught medicine at the universities and other institutions of learning usually also practiced it; they did little, however, with surgery, and spent much of their time commentating the works of the ancients. Of the practicing physicians proper, some had an established residence, others traveled from place to place. The former were usually men systematically trained at the universities and were granted the right to practice their art under certain provisions. These being laid down in an edict of Frederick II in 1224, by virtue of which no individual in the kingdom who had not been examined previously and created a master by the school of Salerno could practice. It required that the study of logic, that is philosophy and philology, be pursued for three years and a course in medicine, including surgery, for five years. The student had to furnish a certificate of legitimate birth and have attained his twenty-fifth year. He was examined publicly on the therapeutics of Galen, the first book of Avicenna and the aphorisms of Hippocrates. He could not enter legally into practice, however, until he had served a year as apprentice to an older and experienced physician. Besides these resident medicists, there were those who practiced as traveling scholars, going from place to place, often in company with a buffoon or jackrake, visiting the markets and places of public gathering, advertising their "wares." This species of charlatan played no small part in the practice of medicine during the whole of the Middle Ages. The pure surgeons of the day were obliged to follow the teachings of a faculty for one year. This period was devoted principally to the study of anatomy. Further knowledge pertaining to their art they gleaned from a master to whom they were apprenticed. They were given the title of *Magistri chirurgiae* and permitted to practice surgery only. Many of these were resident surgeons and members of guilds. Others, as surgeons of the short robe, traveled about performing, often brutally enough, operations for hernias, cutting for stone, doing operations upon the eye, among which couching took first rank, and always making sure to be out of reach of the avenger before the result became manifest. Lastly, there were the barbers and bathers, the former being privileged to do cupping and bleeding, extract teeth and set fractures and dislocations and execute various minor operations and often enough they were guilty of transgressing upon the field of the surgeons. The bathers, like the barbers, did cupping and bleeding and gave clysters.

During this period, too, medical superstition, growing as it did upon a soil so well prepared by vainglorious philosophy and by a scholasticism which had usurped all clear human reasoning, had reached a high stage. Faith in the healing influence of certain astrological phenomena was universal, as also the belief, heightened by religious fanaticism, that the divine influence could and always did alter and direct the functions of the body. Belief in the evil workings of the devil, the healing of the sick by the power of the saints and through relics, amulets and gems was in high favor throughout the Middle Ages and continued in vogue as late as the sixteenth and early seventeenth century. Closely associated with these beliefs was that in the magic art and magic medicine. Though condemned by early Christian emperors, its ideas still survived and its methods frequently shade so insensibly into the superstition, yes, into the religion and philosophy of this period that it often becomes imposible to decide to which of these domains the one or the other belongs.

In the lowest Hell, where punishment for graver sins awaits the doomed, Dante sees among others the workers in the magic art. One of these Virgil points out to him as Michael Scott—

*** * * who of a verity**
Of magical illusions knew the game. (Inf. XX, 116.)

Scott, astrologer of the Hohenstauffen monarch, Frederick II, deserves our recognition as the supposed translator of Avicenna's commentary on Aristotle's De Animalibus. The workers in magic medicine who are associated with Scott in this Bolgia are referred to as they who

*** * * wrought their magic spells with herb and image.**
(Inf. XX, 123.)

The belief in the healing power of gems appears to have been strongly influenced by the writings of Michael Psellus (1020-1105), whose book on the therapeutic action of stones is frequently referred to in medieval medical literature. How deeply this belief had taken root we can gather from later medical writers. Cardan and Paracelsus gave space to its promulgation. From Sir Thomas Browne's Vulgar Errors, the sixth edition published in 1672, I quote the following. Browne writes: "That *lapis lazuli* hath in it a purgative faculty we know; that bezoar is antidotal, *lapis judaicus* diuretical, coral anti-epileptical we will not deny. That cornelians, jaspis, heliotropes and bloodstones may be of virtue to those intentions they are employed, experience and visible effects will make us grant. But that an amethyst prevents inebriation; that an emerald will break if worn in copulation; that a diamond laid under a pillow, will betray the incontinency of a wife; that a sapphire is preservative against enchantments; that the fume of an agate will avert a tempest or the wearing of a chrysophrase make one out of love with gold as some have delivered, we are yet, I confess to believe and in that infidelity are likely to end our days."

Dante refers several times to the mystic virtue of gems, recounting the ruby, topaz, heliotrope and sapphire. Led by Beatrice into the Empyrean, its splendor and brightness bereaves Dante of his vision, but with the aid of Beatrice and by the virtue derived of drinking from the waters of the river of light he becomes enabled to see,

Both of the Courts of Heaven made manifest. (Par. XXX, 96.)

Out of this river issued living sparks,
And on all sides sank down into the flowers,
Like unto rubies that are set in gold. (Par. XXX, 64.)

The water of this river, Beatrice informs him, he needs must drink that his sight might comprehend all the gladness of that Heaven. It is safe to assume that Dante's reference to the

ruby here rests upon the belief that the ruby powdered and taken in water cured diseases of the eyes.

It was during Dante's time that the veneration paid to the Virgin Mary, in earlier times very great, rose to an almost exclusive idolatry. By prayer her aid was invoked in the cure of all ailments, though her particular virtues in this respect were believed to manifest themselves at the natal hour. It is of interest in this connection to quote from the Calendaria of Cardanus (1505-1576) who by the aid of astrology affirms that in this event the request to the Virgin would be sure to be complied with, if on the first day of April at 8 a. m. a prayer invoking her aid were offered. On the fifth terrace of Purgatory, Dante hears uttered amid the weeping,

*** * * * * "Sweet Mary!"**
*** * * * * * * ***

Even as a woman doth who is in child-birth. (Purg. XX, 19.)

In Paradise the spirit of his ancestor Cacciaguida recites of the beauty and simplicity of Florentine customs in his day and adds to such a beautiful life,

Did Mary give me, with loud cries invoked. (Par. XV, 133.)

The same spirit relating of his birth, says of this,

From uttering of the *Ave*, till the birth
In which my mother, who is now a saint,
Of me was lightened who had been her burden. (Par. XVI, 34.)

As mentioned, faith in the medical virtues of the saints and the evil doings of the devil was markedly manifest during the Middle Ages and was shared by all classes. As late as the seventeenth century we find traces of this belief still prevalent among many members of the medical profession.

In the pageant of the Church Militant St. Luke is introduced as

One showed himself as one of the disciples
Of that supreme Hippocrates, whom nature
Made for the animals she holds most dear. (Purg. XXIX, 136.)

St. Luke, writer of the Acts of the Apostles, is supposed to have been both an artist and a physician. Whether he was ordained as healer of any one specific sickness or exercised this function at large I have been unable to learn with certainty. In the Inferno the aid rendered Constantine by St. Sylvester in curing him of his leprosy finds expression in

But even as Constantine sought out Sylvester
To cure his leprosy * * * * (Inf. XXVII, 94.)

This probably finds its source in the *Legenda Aurea*, by de Voragine (1230-1298). I have been unable to find anywhere that Sylvester's aid was specially invoked in the cure of leprosy. Under this heading may be added one further reference. In Paradise, Dante is examined by St. John on Christian love. By the refulgent flame of that saint he becomes so dazzled as to be for the moment bereft of his sight. Beatrice, who

*** * * has in her look**
The power the hand of Ananias had. (Par. XXVI, 12.)

gives Dante back clear vision. It may appear that these references are destitute of medical worth, but in the light of the Middle Ages, the era of miracles, a belief in them was firmly fixed and largely through the contributions and teachings of the clergy. Be it remembered that Paré (1517-1590) was never able to quite divest himself of his belief in saints and monsters. Firmer and more enduring was the belief in the agency of the devil, afflicting humanity with disease in its various forms. The epidemic of St. Vitus's dance in the fourteenth century, for instance, was attributed to the evil workings of the devil. Not alone in the creation of disease were his activities made manifest, but as Martin Luther, in accordance with the existing belief, seeks to have us believe, the infernal spirit was not loath to assume the rights which should be permitted only to the husband: "Es ist wahrlich ein greulich schrecklich Exempel dass der Teufel kann die Leute plagen dass er auch Kinder zeuget" ("Tischreden"). Among the references expressing the evil workings of the devil, the following one serves well to portray this medieval conception:

And as he who falls, and knows not how,
By force of demons who to earth, down drag him,
Or other oppilation that binds man,
When he arises and around him looks,
Wholly bewildered by the mighty anguish
Which he has suffered, and in looking sighs. (Inf. XXIV, 112.)

By "*other oppilation,*" I infer with Dr. Carlyle and Benvenuto that Dante would have us understand the fits of epilepsy. This surely is a more likely interpretation than that given by Jeremy Taylor, who believed that by it is meant gout, dropsy or catarrh. The epileptics, and insane in particular, were believed to be the abode of the devil, a belief first propounded by Origenes, and later greatly furthered by the church. The treatment, often most inhuman, consisted also in prayers, pilgrimages and exorcisms or in the administration of remedies assumed to contain divine puissance. Thus Peter of Spain († 1277):

Who down below in volumnes twelve is shining. (Par. XII, 134.)

tells in his *Thesaurus pauperum*, that the charms of the monks are discarded by him, but that to keep free from epilepsy one needs but suspend about the neck a piece of paper upon which are written the names of the Saints Caspar, Melchior and Balthasar.

Reaching the tenth gulf of hell, Dante meets the forgers and alchemists, who as punishment for their offenses are afflicted with diverse plagues and diseases. This gives him occasion to liken the intensity of their affliction to the sufferings during the plague of Aegina.

I do not think a sadder sight to see
Was in Ægina the whole people sick,
(When was the air so full of pestilence,
The animals, down to the little worm,
All fell, * * * * * *
*** * * * * * * *)**
Than was it to behold through that dark valley
The spirits languishing in divers heaps.
This on the belly, that upon the back
One of the other lay, and others crawling
Shifted themselves along the dismal road.
We step by step went onward without speech,
Gazing upon and listening to the sick
Who had not strength enough to lift their bodies.
(Inf. XXIX, 58.)

The source of the picture which Dante here gives is very probably borrowed from Ovid's account of the plague of Ægina (Metamorphoses, VII), an excerpt of which from Stonestreet's translation will prove of interest.

Their black dry tongues are swelled and scarce can move,
And short thick sighs from panting lungs are drove.
They gape for air, with flatt'ring hopes t'abate
Their raging flames, but that augments their heat.
No bed, no covering can the wretches bear,
But, on the ground, exposed to open air,
They lie, and hope to find a pleasing coolness there.
The suff'ring earth, with that oppression curst,
Returns the heat which they imparted first.
* * * * * * *
Here one, with fainting steps, does slowly creep
O'er heaps of dead, and straight augments the heap;
Another, while his strength and tongue prevailed,
Bewails his friend, and falls himself bewailed;
This with imploring look surveys the skies,
The last dear office of his closing eyes,
But finds the Heavens implacable and dies.

In the sixteenth Canto of Paradise, Dante deplores the downfall and degeneracy of Florence and its citizens, a cause for which he sees in the introduction of families from the neighboring countries and villages. He is told by Cacciaguida that,

Ever the intermingling of the people
Has been the source of malady in cities,
As in the body food it surfeits on. (Par. XVI, 67.)

and

To hear how races waste themselves away,
Will seem to thee no novel thing nor hard,
Seeing that even cities have an end. (Par. XVI. 76.)

These lines have been variously interpreted. Longfellow writes: "Boccaccio seems to have caught something of the spirit of this canto, when lamenting the desolation of Florence by the plague in 1348." It appears that following the epidemics of Rome (1167) and that of Venice (1172) there continued to occur in Europe at intervals, with more or less abatement, outbreaks of a prevailing *pest*, to culminate again in that horrible, devastating epidemic, the Black Death, which it is estimated depopulated Europe during the three years, 1348-1351, of twenty-five million human lives. It is unfortunate so careful a recorder and acute observer as Dante has left us no account of any plague visitation, for it appears conceivable that if not an eye witness he must have had plague horrors related to him. The view of Dante that the intermingling of people is an exciting cause of the spread of diseases in cities was expressed by both Plutarch and Thucydides centuries before. Thucydides (Jowett's translation) writes of the plague of Athens: "As to its probable origin or the causes which might or could have produced such a disturbance of nature, every man, whether a physician or not, will give his own opinion. . . . . The crowding of the people out of the country into the city aggravated the misery; and the newly arrived suffered most. For, having no houses of their own, but inhabiting in the height of summer stifling huts, the mortality among them was dreadful and they perished in wild disorder." Plutarch (Langhorn's translation) writes of this plague, that the people were persuaded, "that the sickness was occasioned by the multitude of out dwellers flocking into the city and a number of people stuffed together in the height of summer in small huts and close cabins where they were forced to live a lazy inactive life, instead of breathing the pure open air to which they had been accustomed."

With the anatomical references in the Divine Comedy must be associated those to physiology, for it was not until the late sixteenth and the seventeenth centuries that physiology was placed upon a pure rational and scientific basis through the labors of such masters as Galileo, Newton and Borelli in physics and in particular through the efforts and discoveries of Harvey, Hales, Magendie, Spallanzani and others of their type, but especially those of Haller, who has been and is still honored with the proud appelation of the father of physiology. The anatomy and physiology in Dante is largely that propounded by Galen. As deserving of notice Galen was the first to apply methods of experimentation and vivisection to physiology (Baas). Unfortunately he so overburdened his teachings of this science with false speculations and visionary conceits that these more than his experimental science left their impress upon the Middle Ages. To enter upon the physiology of Galen would lead beyond the confines of this paper. It, as did all of what was Galen's, exercised a paramount influence over medicine and was most firmly and slavishly adhered to.

For a better interpretation of the medical references that follow a brief outline of the salient points of Galen's physiology or better philosophico-physiological views may not be amiss. Galen believed that in man there are three actuating impulses—namely: spirits, humors and solids. The solids he divided into simple or similar and organic or compound. The former being represented by the bones, flesh, nerves, etc., the latter by the arms, legs, head, etc., because these are formed of the several similar parts. The dynamical forces of the soul or *pneuma* he divides, with Hippocrates and Aristotle, into four primordial qualities: heat, cold, dryness and humidity. These by their individual or united action influence all transformations of the human system. This pneuma vitalizes in the body a natural spirit, located in the liver and renal veins; an animal spirit in the brain and nerves, and a vital spirit in the arteries and heart. Subordinate to these are special faculties of the body that function occasionally, as the attractive, the repulsive, the retentive and the secreting faculties. The natural spirits originating with the veins in the liver proceed from thence with the blood to the heart, to be mixed with air, which that viscus attracts from the lungs, and uniting with it forms the vital spirit. This is then conducted by the arteries to all parts of the system, but chiefly to the brain where it is converted into the animal spirit. By these essences the action of production, nutrition and growth are maintained.

From the general character of Galen's presentation of the distribution of the sanguinary fluids it is a rational conclusion, perhaps, to assume his practical acquaintanceship with the circulation of the blood, but whether, as some medico-historical writers would have us believe, a knowledge of the utility of the

venous valves and of the true function of the heart was alone essential to deck him with the laurels that have come to Harvey had better be relegated to the realm of fruitless speculation.

Of more than common interest are the references found in the Divine Comedy relating to the circulatory system. Much stress has been laid upon the fact that Dante speaks of the pulse and distinguishes between veins and arteries, and upon this fact alone several of his commentators have chosen to base, in part at least, the contention that Dante knew medicine, or would infer that he antedated Harvey even. Thus Schlosser in his *Welt Geschichte* writes, "Anatomie und Physiologie [kannte er] besser als man für seine Zeiten denken sollte—Erst durch Harvey wurde nämlich die Lehre vom Blutlauf diesseits der Alpen verbreitet. Dante deutet aber gleich in Anfange seines Gedichts auf Puls und Blutadern hin." The passage to which Schlosser has reference occurs in the first canto of the Inferno. Dante, being driven back from the path he pursued by the she wolf, implores Virgil's protection with

"Do thou protect me from her, famous Sage,
For she doth make my veins and pulses tremble." (Inf. I, 89.)

In recounting the humiliation of Provenzan Salvani, to which he bowed himself, that he might save his friend, the shame of which was so great that

He brought himself to tremble in each vein. (Purg. XI, 138.)

This throbbing of the pulses finds more forcible expression when Dante finds himself deprived of Virgil's guidance in

*** * * * * "Not a drachm**
Of blood remains in me that doth not tremble." (Purg. XXX, 46.)

Whether or not Dante distinguished arterial from venous blood is perhaps given expression to in the ninth canto of Purgatory, where Dante likens the third and uppermost stairs of the gate leading to that Heaven, and which is made of porphyry, to the color of blood—

*** * * as flaming red**
As blood that from a vein is spirting forth. (Purg. IX, 101.)

Lanfranchi († 1315) is said to have been the first to distinguish between arterial and venous hemorrhage. Dante appears to have shared with Galen the belief prevalent also in his own time, that the blood was the seat of life. This is expressed in several passages. The shade of De Vinea tells Dante that the fidelity which he, Frederick's chancellor, bore his master was of such magnitude that he thereby lost his sleep and *pulses* (life) (Inf. XIII, 63). In Purgatory Jacopo del Cassero, reciting his past, speaks of his death from

*** * * * the deep wounds, through which**
Issued the blood wherein I had my seat. (Purg. V, 73.)

In the same book we are told that Christ liberated us with his *veins* (Purg. XXIII, 74).

It is rather striking to note the frequent references Dante makes to vision, its anatomy and physiology. The flashing, dazzling, brilliant lights in Purgatory and Paradise naturally call for expressions indicating the effect on the vision. However, the fact that he was interested in and busied himself with optics, and at one time suffered from severe ocular trouble, appears to have left a profound impress upon him. He speaks of it in the *Convito*, saying that the stars appeared to him as seen through a fog, and that he regained his clear vision only after a lengthy rest of his eyes in dark and cool surroundings and by the application of cold compresses, and this may naturally have rendered him more acutely sensitive to matters pertaining to vision. The effects of the bright lights are well expressed in

Even as a man who gazes, and endeavors
To see the eclipsing of the sun a little,
And, who by seeing sightless doth become,
So I became before that latest fire. (Par. XXV, 118.)

And that condition of the sight which is
In eyes but lately smitten by the sun
Bereft me of my vision some short while. (Purg. XXXII, 10.)

We meet with frequent references to squint and are told that as volition moves the eyes, they

Must needs together shut and lift themselves. (Par. XII, 26.)

We are told of spirits who carried their chin lifted upward like a blind man. To note the approach of an angel, who opens to Virgil and Dante the gates of the city of Dis, Virgil calls upon Dante to

*** * * * "Direct the nerve**
Of vision now along that ancient foam." (Inf. IX, 73.)

That the optic nerve effected the sight by having the rays of light intercepted and conducted to it by the *spirits* which are found between the lens and choroid was the accepted opinion in Dante's age. In making known to Dante that the departed spirits know things past and to come but are ignorant of things present, a spirit tells him:

"We see, like those who have imperfect sight,
The things," he said, "that distant are from us." (Inf. X, 100.)

We can safely infer, I think, that Dante has in mind the condition of "old sight" or presbyopia.

Roger Bacon (1214-1292 (1298)) knew lenses and that they were useful for near vision in the old. For optical purposes they appear to have been ground first about 1285 by a certain Salvino degli Armati, said to have died in 1317. A monk of Pisa, Alexander della Spina, who died in 1313, also has been accredited with the invention of spectacles and with the promotion of their use. So we see that lenses for optical purposes really came generally into use after Dante's time and that presbyopia the cause of the "imperfect sight," that sees only, "the things that distant are from us" then went uncorrected.

In the Inferno we find the largest number of references of a purely anatomical nature. These are for the most part, in fact almost entirely, very general. The spirits in the Inferno, suffering the tortures of the condemned, having their forms vivisected, torn and mutilated, their every parts exposed, and meeting our poet thus, would naturally call upon the anatomical knowledge of Dante to give an adequate account of what he saw. This is done free from all descriptive exactness, with an aim to present the tortures of Hell in the most awful and

terrible light, the better to work upon the feelings of men. The few quotations I give will illustrate the form descriptive anatomy takes in the poem. In the ninth gulf of Hell, Dante meets with Mahomet who is,

Rent from the chin to where one breaketh wind.
Between his legs were hanging down his entrails;
His heart was visible, and the dismal sack
That maketh excrement of what is eaten. (Inf. XXVIII, 24.)

Another shade speaks these words:

Parted do I now bear my brain, alas!
From its beginning, which is in this trunk.[1] (Inf. XXVIII, 140.)

He sees a demon clutch a sinner by

*** * * the sinews of the feet.**[2] (Inf. XXI, 36.)

One unfortunate is transfixed by a serpent

There where the neck is knotted to the shoulders.[3] (Inf. XXIV, 98.)

Still another is pierced through

*** * * in that part**[4] *** * * whereat is first received**
Our aliment * * * * * (Inf. XXV, 85.)

Cary translates this passage, "In that part whence our life is nourished first—" (*Donde prima é preso nostro alimento*). It was generally held down to Dante's time that the human fœtus breathed and was nourished through the umbilicus and by sucking upon the cotyledons. This opinion is probably based upon the study of the placentæ in the higher mammals, especially the pig, which were used almost exclusively for anatomical studies in the Middle Ages, and the results obtained were assumed to apply also to man. We can readily understand the faith in the mentioned belief if we recall that in the non-deciduate placentæ (the forms most commonly met with in the animals thus employed) the chorionic villi are concentrated into definite patches or cotyledons, which at birth separate from the uterine mucous membrane, without tearing the latter away. The spirit of Guido Count of Montefeltro tells Dante that the deeds he did were given him by his mother

While I was still the form of bone and pulp. (Inf. XXVII, 73.)

This passage conforms with the belief current during the greater part of the Middle Ages, that from the semen are first formed the membranes—"pulp"—a portion of these are then transformed into cartilage and bone, another into blood vessels, fibers, nerves and so on. In another passage Dante refers to his position standing next to Virgil as being

Upon that side where people have their hearts. (Purg. X, 48.)

In connection with this line one should recall that Galen, basing his opinion upon the finding in animals, assigned also to the human heart, a position in the center of the thoracic cavity. It remained so until Vesalius (1513-1564) gave it its true position.

Perhaps of greatest interest among the medical references in the entire Divine Comedy is the following. Dante, seeking to inform himself on the natural process involved in the birth and development of the human body, begs Virgil to enlighten him. Virgil prays Statius that he give to our poet the enlightment sought. Statius then turns to Dante with

*** * * * * "Son, if these words of mine**
Thy mind doth contemplate and doth receive,
They'll be thy light unto the How thou sayest.
The perfect blood, which never is drunk up
Into the thirsty veins, and which remaineth
Like food that from the table thou removest,
Takes in the heart for all the human members
Virtue informative, as being that
Which to be changed to them goes through the veins.
Again digest, descends it where 't is better
Silent to be than say; and then drops thence,
Upon another's blood in natural vase.
There one together with the other mingles,
One to be passive meant, the other active
By reason of the perfect place it springs from;
And being conjoined, begins to operate,
Coagulating first, then vivifying
What for its matter it had made consistent.
The active virtue, being made a soul
As of a plant (in so far different,
This on the way is, that arrived already)
Then works so much, that now it moves and feels
Like a sea-fungus, and then undertakes
To organize the powers whose seed it is.
Now, Son, dilates and now distends itself
The virtue from the generator's heart,
Where nature is intent, on all the members.
But how from animal it man becomes
Thou dost not see as yet; this is a point
Which made a wiser man than thou once err
So far, that in his doctrine separate
He made the soul from possible intellect,
For he no organ saw by this assumed.
Open thy breast unto the truth that's coming,
And know that, just as soon as in the fœtus
The articulation of the brain is perfect,
The primal Motor turns to it well pleased
At so great art of nature, and inspires
A spirit new with virtue all replete,
Which what it finds there active doth attract
Into its substance, and becomes one soul,
Which lives, and feels, and on itself revolves.
And that thou less may wonder at my word,
Behold the sun's heat, which becometh wine,
Joined to the juice that from the vine distils.
Whenever Lachesis hath no more thread,
It separates from the flesh, and virtually
Bears with itself the human and divine;
The other faculties are voiceless all;
The memory, the intelligence, and the will
In action far more vigorous than before.
Without a pause it falleth of itself
In marvellous way on one shore or the other;
There of its roads it first is cognizant.
Soon as the place there circumscribeth it,
The virtue informative rays round about,
As, and as much as, in the living members.
And even as the air, when full of rain,
By alien rays that are therein reflected,
With divers colors shows itself adorned,
So there the neighboring air doth shape itself

[1] Spinal cord.
[2] Tendon of Achilles.
[3] Seventh cervical vertebra.
[4] The navel.

Into that form which doth impress upon it
Virtually the soul that has stood still.
And then in manner of the little flame,
Which followeth the fire where'er it shifts,
After the spirit followeth its new form.
Since afterwards it takes from this its semblance,
It is called shade; and thence it organizes
Thereafter every sense, even to the sight.
Thence is it that we speak, and thence we laugh;
Thence is it that we form the tears and sighs,

* * * * * * *

According as impress us, our desires
And other affections, so the shade is shaped,
And this is cause of what thou wonderest at." (Purg. XXV, 33.)

I have given this discourse of Statius thus complete, both for its medical interest and for its exemplifying, perhaps better than any other one passage in the Divine Comedy, the wonderful power of Dante in blending into poetry his science, philosophy and theology. Comments upon this passage are not wanting. Averroës, Thomas Aquinas, Galen, Aristotle and Hippocrates are mentioned as co-contributors. Quotations from the lengthy dissertations of these authors bearing on this interesting subject cannot be given here, but a few brief notes may serve to add interest to it. The *perfect blood* which is not taken up by the veins, is the arterial, the abode of the vital spirits, the venous blood serving merely in nutrition. In the heart the blood is perfected; this appears purely an adoption from Galen. Dante's view relative to the "mingling" of the sexual elements to which he refers as blood, is expressed figuratively. The male element, the semen, was believed even in very ancient times to contribute directly as such in the formation of the fœtus, for Hippocrates and Aristotle taught that it came from all parts of the body, and Galen from the blood in the testicle. The female element was generally also regarded as semen; this Galen leads from the ovary downward through the excretory ducts (the Fallopian tubes) and during and after coition, believes it to be uniformly mixed with the male element. Hippocrates and Aristotle held the female semen to be a vaginal secretion which during coition was increased in quantity. Aristotle states that the female projects her semen into the os uteri, where also that from the male is received; these mingling are from thence drawn into the uterus by inhalation, in the manner we inhale through mouth or nostril. Dioscorides, whom Dante mentions by name, and Athenæus, were of the opinion that in the female the menstrual blood serves as the material mass and that the male semen gives form to the new life. The conception that one of the elements is passive and the other active is probably also borrowed from Galen, who taught that the semen of the male was hotter and of denser consistency than that of the female, which latter in accordance with the greater "coldness of women," was colder and very fluid and acted merely as an excipient and nutritive material, giving rise to the fœtal membranes only, while the male semen was concerned in the making of the brain, the seat of the rational soul. The comparison Dante draws between the vegetative soul of man and that of the plant is this, that in man it must be developed, whereas in plants it is from the first complete. In man the vegetative soul in its development is converted into the sensitive soul. The "man" referred to by Statius as wiser than Dante is generally accepted to be Averroës, He who taught that the minds of all men were pervaded by one and the same universal intellect. It may be added that science and philosophy were confirmed in the opinion that the soul of the new life was breathed into it by God.

The purely medical references, *i. e.*, to internal medicine, leave no doubt that Dante was in possession of more than a lay knowledge of this branch of medical science. It is markedly apparent that, as compared to the purely anatomical references, these are characterized by a much greater descriptive exactness, denoting a keener study and insight; nor is this to be wondered at if we stop to recall the state into which anatomy had lapsed during the thirteenth and early fourteenth centuries. Medicine, through the impulse given it by the Arabs and by the freer dissemination of Greek medicine, continued more active and certainly, though in small measure, progressive, while anatomy on the contrary remained where Galen had left it.

Leprosy, so prevalent during the thirteenth century, is frequently referred to by Dante. He tells of two spirits so afflicted:

I saw two sitting leaned against each other,
As leans in heating platter against platter,
From head to foot bespotted o'er with scabs;
And never saw I plied a currycomb
By stable-boy for whom his master waits,
Or him who keeps awake unwillingly,
As every one was plying fast the bite
Of nails upon himself, for the great rage
Of itching which no other succor had.
And the nails downward with them dragged the scab,
In fashion as a knife the scales of bream,
Or any other fish that has them largest. (Inf. XXIX, 73.)

Evidently Dante seeks to picture what we today would term nodular or tubercular leprosy, in the advanced stage of which there is frequently associated pain, irritation and desquamation, which latter when excessive gives rise to an appearance not unlike that of ichthyosis, whereupon rests the poet's reference to the scales of fish. The ultimate loss of the nails in this disease finds expression in these words, addressed by Virgil to a leper who plies himself with scratching:

"* * * so may thy nails suffice thee
To all eternity unto this work." (Inf. XXIX, 89.)

Dante meeting his friend Forese among the spirits in Purgatory, recognizes him only by hearing his voice, and is appealed to with

"Ah, do not look at this dry leprosy,"
Entreated he, "which doth my skin discolor,
Nor at default of flesh that I may have." (Purg. XXIII, 49.)

The nodular form of leprosy, attacking frequently first the face and ears, often enlarging these and giving rise to a massing of nodules on the brow, with a consequent deepening of the natural furrows, especially at the root of the nose, produces a peculiar lion-like aspect, to which the ancients gave the name

of *leontiasis*. If we picture Forese so afflicted we can well see why Dante should have failed to recognize him.

The crusaders were largely instrumental in disseminating leprosy in Europe. It had reached its height at about the time that Dante lived, abating gradually until in the latter part of the sixteenth century it disappeared practically from the list of endemic diseases in middle Europe. The belief in its contagious nature, established in ancient times, led to the isolation of those suffering with it. In Europe and especially in Italy were special institutions (*lazzeretti*) erected for lepers, mostly in secluded places or beyond the city gates. The inmates of these were under general surveillance, and were given in many places special clothing, marked to indicate their affliction, or had to carry a wooden rattle to make known their approach or a cane with which to point out or touch what they wished. Means of support other than begging was denied them, and they were generally shunned or treated as outcasts. This is expressed in an address of Dante to two spirits—

"Let not your foul and loathsome punishment
Make you afraid to show yourselves to me." (Inf. XXIX, 107.)

A further great scourge, widespread over most of Italy and southern Europe, was malaria. A short excerpt taken from Murray's Handbook of Central Italy, depicting the devastation of malaria in Italy, is not without interest in this connection. In reading of the Lake of Bolsena, in the vicinity of Rome, we are informed that, "The treacherous beauty of the lake conceals malaria in its most fatal forms; and its shores, although there are no traces of a marsh, are deserted, excepting where a few sickly hamlets are scattered on their western slopes. The ground is cultivated in many places down to the water's edge, but the laborers dare not sleep for a single night, during the summer or autumn, on the plains where they work by day; and a large tract of beautiful and productive country is reduced to a perfect solitude by this invisible calamity. Nothing can be more striking than the appearance of the lake, without a single sail upon its waters, and with scarcely a human habitation within sight of Bolsena; and nothing perhaps can give the traveler who visits Italy for the first time a more impressive idea of the effects of malaria." In the tenth gulf of Hell the spirits' suffering is intense, such that Dante writes of it,

What pain would be if from the hospitals
Of Valdichiana, 'twixt July and September,
And of Maremma and Sardinia
All the diseases in one moat were gathered,
Such was it here, and such stench came from it
As from putrescent limbs is wont to issue. (Inf. XXIX, 46.)

Dante's mention of the time "'twixt July and September" indicates that period of the year in which malaria was at its worst. The marshy regions of Italy, the Maremma, along the coast of the Tyrrhenian sea, stretching from the mouth of the river Magra to that of the river Volturno, were up to within comparatively recent times uninhabitable because of the marked prevalence of malaria. Systems of drainage and filling in have now made this region habitable and converted it into a rich and fertile area. In Dante's time these marshes represented an absolute waste; no less desolate than the region about the Lake of Bolsena. What stench must have been created in the hospital wards, such as they were, where coction or suppuration was above all things promoted in the treatment of wounds and other surgical lesions! Of interest is the following reference. Dante, who is to mount upon the back of Geryon, becomes unnerved,

Such as he is who has so near the ague
Of quartan that his nails are blue already,
And trembles all, but looking at the shade. (Inf. XVII, 85.)

Very probably the chills and rigors characteristic of the cold stage in malaria are here thought of. However the term, *quartan*, most usually applied to one form of malaria in the present day, had in Dante's age a more general and wider application. The classification of fevers in vogue then being into semitertians, tertians, quartans, quintans, septans and nonans. The prognosis depended much upon whether these were intermittent or protracted, whether diurnal or nocturnal. The quartan fever was considered as not only free from evil consequences but even favorably, in that it was thought to often carry off other diseases with which the patient suffered.

The following lines intimate Dante's keen powers of observation and are of interest in their medical allusion. He sees a spirit stung by a serpent; the spirit looked at his aggressor,

*** * * but said naught;**
Nay, rather with feet motionless he yawned,
Just as if sleep or fever had assailed him. (Inf. XXV, 88.)

Dante probably gleaned this from observing the lassitude and desire to yawn and stretch which is so commonly felt at the onset of intermittent fevers and particularly so in the first stage of malarial paroxysms.

In the tenth gulf of Hell, Dante is held fascinated by a dispute and wrangle between two sinners, Adam of Brescia, a counterfitter, and Sinon, the Greek, who persuaded the Trojans to accept the wooden horse. Of the former we are given this description:

I saw one made in fashion of a lute,
If he had only had the groin cut off
Just at the point at which a man is forked.
The heavy dropsy, that so disproportions
The limbs with humors, which it ill concocts,
That the face corresponds not to the belly,
Compelled him so to hold his lips apart
As does the hectic, who because of thirst
One tow'rds the chin, the other upward turns. (Inf. XXX, 49.)

Adam confides to Dante his craving for a drop of water and tells him that his memory of verdant streams dries him up more

Than the disease which strips my face of flesh.
(Inf. XXX, 70.)

So heavy is he with his dropsy that in a hundred years he can not move an inch. Upon request of Dante, Adam gives information of his neighbor, Sinon of Troy, who is smoking as "a wet hand does in winter," and who reeks with acute fever. Sinon becomes angered at Adam for the account given Dante of him, and to avenge this strikes Adam

*** * * with the fist upon his hardened paunch**
It gave a sound as if it were a drum. (Inf. XXX, 102.)

Adam retaliates by striking Sinon in the face "that did not seem less hard," than Adam's paunch. An altercation between these two then follows, in which Sinon addresses Adam with

"And rueful be it to thee the whole world knows it."
"Rueful to thee the thirst be where with cracks
Thy tongue," the Greek said, "and the putrid water
That hedges so thy paunch before thine eyes." (Inf. XXX, 119.)

To which the false coiner makes reply,

*** * * * * "So is gaping wide**
Thy mouth for speaking evil, as 't is wont;
Because if I have thirst and humor[5] stuff me,
Thou hast the burning and the head that aches,
And to lick up the mirror of Narcissus
Thou wouldst not want words many to invite thee."
(Inf. XXX, 125.)

To diagnose the disease with which Dante would have us know Adam is afflicted may appear to be of idle purpose; but granting permission to speculate, the heavy dropsy, the wasted features may be assumed to conform to the ascites and facies met with in hepatic cirrhosis. And the hectic, with cracked tongue longing for water, with a paunch that when struck sounds like a drum, and again the facial expression (Hippocratic facies), brings to mind general peritonitis, for it is common to see these both in one, and the patient down with hepatic cirrhosis dies of secondary peritonitis. Dante's remark, applied to Sinon, whom he saw "smoking like unto a wet hand in winter," is probably learned from Hippocrates. Francis Adams' translation of Hippocrates' treatise on Airs contains the following remarks: "A common fever (epidemic) therefore is such because all draw in the same breath (pneuma)." Hippocrates afterwards attempts an explanation of the phenomena of rigors, which, however is not very intelligible, and then of the febrile heat and *sweats* which succeed them. The latter he compares to the "condensed steam of boiling water." The views concerning dropsy current in Dante's day were largely those of Hippocrates and Galen, their opinions being the code taught. Hippocrates held that there were "two kinds of dropsy, the one anasarca, which when formed is incurable, the other is accompanied with emphysema (tympanites?) and requires much good fortune to enable one to triumph over it." Galen's commentary on this informs us that in place of two dropsies there are three at least, meaning by these, anasarca, ascites and tympanites. A like opinion is given by Paulus Ægineta.

The following reference seems in its medical affirmation almost as if spoken by a physician. Dante meets with the spirits punished for soothsaying. They, because they sought to see before them and foretell things, are made to look and move backwards. Dante sees some who

Wondrously * * * seemed * * * distorted,
From chin to the beginning of the chest;
For tow'rds the reins the countenance was turned,
And backward it behooved them to advance,
As to look forward had been taken from them.
Perchance indeed by violence of palsy
Some one has been thus wholly turned awry;
But I ne'er saw it, nor beieve it can be. (Inf. XIX, 11.)

The physicians worthy of mention in the Divine Comedy we can dismiss with a few remarks, for in accordance with the nature of the poem they are given no opportunity to practice their art. For the same reason also we meet with a total absence of any reference to therapeutics. The physicians for the most part are but mentioned by name and grouped with other spirits in interesting assemblages and, like all of Dante's characters, are presented merely as representative types. Dante entering the first circle of the Inferno, the Limbo, where are those virtuous but unbaptised, finds among the spirits there

Galen, Hippocrates and Avicenna,
Averroes who the great Comment made. (Inf. IV, 143.)

In their circle also,

Of qualities I saw the good collector,
Hight Dioscorides. * * * * (Inf. IV, 140.)

Associated with these are the philosophers and other great spirits, the master of this throng,

All gaze upon him and all do him honor. (Inf. IV, 133.)

is Aristotle. Of these Hippocrates, Averroes and Aristotle receive further mention in the Comedy. In an allusion which Dante makes to the pursuit of worldly things instead of Divine, he mentions Taddeo, as type representative of those following the former. A like allusion is found in the line

One after laws and one to aphorisms. (Par. XI, 4.)

Here undoubtedly Dante refers to the well-known Aphorisms of Hippocrates.

Whether or not Dante knew these masters by their works need not concern us, though it is fair to assume that he did, at least in part and his many commentators appear to concede this, especially on the ground that to join the guild of physicians and apothecaries some knowledge of medicine must have been his as a prerequisite.

To the medical student these names are familiar. Aristotle, Hippocrates and Galen are too well known to require any comment, excepting perhaps that Aristotle came in contact with medicine really only through his physiology and his researches in the field of comparative anatomy.

Avicenna (980-1037), surnamed by the Arabs, the Prince of Physicians, enjoyed, next to Galen, the greatest authority in the medical world of the Middle Ages. The author of some hundred and five known writings, his *Canon Medicinæ*, a system of medicine in five books, was the text and law in medical art and in its Latin translation served this purpose as late as the seventeenth century. His reputation heightened by the nullity of his time, was gained more through his technical abilities and high cast positions than by his scientific accomplishments. His works were largely mere compilations.

[5] Moisture.

Dioscorides' (40-90) fame rests upon his materia medica, which work endured throughout the Middle Age as the main text-book on this subject. He is said to have recognized some four hundred plants. From among his medicines some are given place in the pharmacopeias of today, among others, castor oil, cinnamon, fern and aloes.

Averroës (1126-1148), like Aristotle, philosopher rather than physician, translated the writings of the latter into Arabic from which tongue they were rendered into Latin, first, it is stated, in 1472. His writings are of interest to the physician in that they have supplied numerous commentaries to those of Aristotle, treating on medical subjects, and in opposing many of Galen's views. The writings of the authors mentioned were those most extensively employed as texts in medicine in the time of Dante; from them the profesors in medicine read to their classes, explaining, translating and making compendiums from and comments to them.

Thaddaeus, of Florence (1215-1295 (1303)) was a contemporary of Dante. He held a professorship in medicine in Bologna. Through his efforts the practical introduction of Arabic sciences into the medical schools of Italy was largely due. He is also generally accredited as being the first known medieval writer who assayed in good faith and with excellent judgment, to unite the philosophy of the age with rational medicine. From his professional career resulted the translation of Aristotle, commended by Dante in the *Convito,* and his comments on the Aphorisms and Prognostications of Hippocrates and Galen. He is mentioned by the early commentators of Dante as having been the most skilled physician of his age and in originality equal to Hippocrates. Dante's choice of him as a representative of those engaged in pursuit of worldly things may rest upon the quoted fact that Thaddaeus was notorius for his exorbitant fees and his covetousness. We are told that in 1285 he asked three thousand Bolognese lires and an escort to and from the place for his services in attending an Italian nobleman.

We might add to this list of physicians the names of some who while not referred to by Dante as such, yet deserve recognition from the medical student. From among the ancients to whom Dante gives a place in the Divine Comedy we may select, Thales of Miletus, Anaxagoras, Empedocles (to whom we owe the terms amnion and chorion), Heraclitus, Democritus, Epicurus and Zeno. These philosophers were metaphysicians and physicists (natural philosophers) as well, and in those capaities exercised a very essential influence upon Greek medicine. The philosophers of the Middle Ages, who busied themselves incidentally with medicine, that being a branch of medieval philosophy, are represented by Albertus Magnus, Thomas Aquinas, Hugo de St. Victaire and Peter of Spain. The opinions of Albertus Magnus and Thomas Aquinas exercised a most profound influence upon the medicine and the natural sciences generally during the entire Middle Ages following the period in which they lived.

Considered by themselves, the medical references in the Divine Comedy give no reliable index from which to form an opinion of Dante's medical knowledge. True some few give evidence that Dante was not a stranger in this art, and that without doubt he gleaned also from observation, yet we can ill afford to claim these as the product of a mind especially trained in medicine. For the most part the references are popular and general and at best tend to give but a partial reflection of the medicine current in Dante's time. As we read it in the Divine Comedy it is the medicine of Hippocrates and Galen, with a touch of the Arabic, and interwoven with theology and mysticism. Whether what it expresses was Dante's belief we can not decide. Dante may have believed with some of the ablest minds of his day in the virtue of gems and amulets, in magic and in the healing powers of the saints and the evil workings of the devil, or he may have shared these beliefs as little as we do today. His age professed such beliefs and he may have availed himself of its creed in medicine, as in other things, the better to induce appreciation of his poem, for he intended it to be read by all men and therefore wrote it in the "vulgar" tongue. The medicine in Homer, Shakespeare or Goethe has not proved these authors to have been physicians, neither can that of the Divine Comedy or for that matter, that in any of Dante's writings make out Dante a physician. The truth is, that it was only as a poet that Dante was great and original, and whether physician or not, he did not intend to convey his knowledge of medicine to us, but drew upon it merely as he did upon all those branches of science and art with which his genius and wide range of learning had acquainted him to contribute their share in the making of the pillars of that enduring superstructure the Divine Comedy, the ineffaceable mirror of the Dantean Age.

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It would require a very large volume to contain nothing more than the names of almost innumerable particular and special students of and treatises that have been published on the Divine Comedy. I doubt not that more than one dissertation on the medicine in the Divine Comedy may be found amongst the literature of different nations, if it were sought for amongst the hundreds of books and thousands of pamphlets. I have made no effort to find one. I have availed myself of and borrowed freely from many books, deemed reliable sources treating on the life of Dante, on the history of medicine and the history of that age. A few of those I have found most helpful are here added.

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MOLIÈRE AND THE PHYSICIAN.

By Max Kahn, M. A., M. D., New York.

Boileau, the brilliant and outspoken critic of the French Elizabethan Era, in a conversation with Louis XIV, informed the *Grand Monarque* that he considered Molière the greatest of French writers, whereat Louis the Great sneered. It was this same critic, who, on being asked his opinion of some stanzas written by the King, cleverly replied: "Sire, in all things are you successful. You had desired to write the worst poem in the world, and you have admirably fulfilled your wish." We know not what the scion of the Bourbons retorted, nor how he felt. That he took it coolly is really praiseworthy. It is no wonder that the French king, although he always felt a kindness for the great humorist, disagreed with Boileau. The son of an upholsterer, the man who so inimitably strutted on the stage personifying ludicrous personages, could not, in the opinion of Louis XIV, be the greatest *littérateur* in France.

Not only this monarch, but many wise men in later times, took issue with Boileau. Corneille, Racine, La Fontaine, La Rochefoucauld have all been given precedence over the man who has made the whole world laugh for several centuries. During life Molière suffered intensely from lack of appreciation by the populace and the nobility. Every courtier behaved superciliously toward the cleverest man in the court. He was very poor. Twice he was imprisoned because of lack of funds for the payment of certain debts that were incurred in his attempts to organize a theatre. The clergy were openly against him. The faculty of medicine was silent, because of impotency. At death he was refused consecrated burial, and only a mandate from Louis XIV secured for him religious rites at his funeral. He was interred on a rainy day. The beadle or sexton forgot to mark the grave wherein Molière was laid, so that even the last resting place of the greatest of French dramatists is not known.

All the sciences were at first feared and opposed. So was medicine. What we do not understand, we fear or ridicule. The physician as the expounder of the mysterious science of medicine has, in all ages, caused fear in the timid and has been the butt of criticism from the skeptics. Only a few who have understood have given the physician and his art their just honor and respect.

Molière was not of these. He understood, I firmly believe, the true value of medicine, but he was disgusted with the practice of it in the seventeenth century. When science is degraded to quackery, and when the physician pursues the methods of the charlatan, there is certain to arise a violent opposition to such flagrant ignorance and dishonesty. The dramas "Monsieur de Pourceaugnac," "The Flying Physician," "The Doctor in Spite of Himself," and "The Doctor in Love" were the direct outcome of a healthy dissatisfaction with a profession whose only claim to efficacy was that it had not changed since the days of Hippocrates and Galen, and which took more pride in black gowns and Latin gibberish than in diagnosis and prognosis. When it is said that Molière was feared by churchmen and physicians one has said enough against the reputation of the physicians of those days. A man who was so logical as to be against the clergy of the seventeenth century must have had enough cause for opposing the medical faculty of the time.

Jean Baptiste Poquelin was born in Paris in the month of January, 1622, six years after the death of the world's greatest dramatist in Stratford-upon-Avon. His father was an industrious and thrifty upholsterer. That the Poquelin family was well-to-do is to be seen from the inventory given in the will of Jean Baptiste's mother. She bequeathed silverware and goldware and certain diamonds to the members of her family, and left each of her children an inheritance of five thousand livres. The story extant that the future dramatist suffered from the tight-fistedness of his father is improbable. Doubtless his father with the usual bourgeois respect for gold, was dissatisfied with the tastes of his son. Nevertheless, he paid his son's debts and saw to it that the boy received an education above that of the average lad of the period.

When yet a boy, Jean Baptiste found his father's trade distasteful. The attraction of the streets, where gay things were to be seen, was more to him than the disgusting monotony of the upholsterer's shop, where success depended upon orderliness, punctuality and lacquey-like fawning upon noble customers. Molière was never punctual nor strictly orderly, and certainly he never could toady, and lacking these qualities there was naught in his ancestor's business to please him. The smell of glue in his father's shop could not satisfy the poet who loved the odors of sweet smelling flowers and the beauty of the fields and the sunshine and the forests.

The streets of Paris, though very narrow and very dirty in those days, were quite gay. Swashbuckling musketeers haughtily strutted about and were very happy in provoking duels. They fought for insults to the king or their regiment, or to prove the superiority of certain sweethearts, or for the

honor of chastising peasants. It is said that the redoubtable Cyrano de Bergerac, whom Rostand has made the hero of his best drama, fought a dozen times and killed ten adversaries in order to defend the honor of his own elephantine proboscis. Grisettes, wenches and quacks traversed all the thoroughfares, and accosted all passers-by who seemed capable of spending some sous. In certain main streets, it was especially interesting. In the rue de Pont Neuf, the comedians of the day used to perform for the benefit of the public. Here young Jean Baptiste was Bellerose and Mondory and Gros Guillaume, all famous artists of that time, who set the audiences roaring at their coarse jests and phantastic contortions. Here, also, he saw Guillot Gorju, the actor quack, who ridiculed *les médecins*, and whose sharp witticisms Molière incorporated later into his dramas.

At the age of fourteen Molière was sent to the Jesuit College at Clermont near Paris, where he associated with sons of the nobility. Here he undoubtedly saw Prince Armand de Conti who later became his patron. There is no evidence, however, that this prince ever so much as talked to the low born Poquelin. Little else is known of Molière's student life. He studied for some time under Gassendi. He especially admired Lucretius and Terence among the ancients and Rabelais among the moderns. He left the above named institution, after a course of study of several years, for the law school at Orleans, "where," as his enemy Le Boulanger de Chalussay has it, "any donkey could buy a diploma." However, he went to the law courts only once.

A tradition would have it that Molière studied for the priesthood, but this is wholly a fable, for the bright-witted, free-willed Molière could never brook a monkish life with its restrictions and monotony. Still, if he ever did intend to practice law or study theology, the purpose must have been more desultory than serious, for we find him in the month of January, 1643, fully embarked on the venturesome career of comedian and stage manager. (Chatfield-Taylor: Life of Molière.)

Travelling, actor-like, he fell in with the Béjart family, a strolling band of performers, and soon ingratiated himself in favor of Madeline Béjart whom he married. Aided by his sweetheart and the whole company, he opened "The Illustrious Theatre." This venture was a failure, and after being imprisoned twice for debt, Molière had to flee Paris to escape another incarceration in the debtor's jail. Together with his company he strolled over France and appeared in Bordeaux, Toulouse, Lyons, Orleans, Limoges, Narbonne and Pézenas at different periods, everywhere receiving permission to erect a stage to perform comedies.

Successively under the patronage of Duke D'Epernon and Prince de Conti, the fortunes of the poet began to flourish. In the provinces and in the capitol, Molière kept his eyes open and he himself began to ridicule the foibles and vanities of the average Parisian bourgeois. Soon dramatic works followed one another, and his fame reached the ears of the king, who from this time forward was quite a generous patron. During this period he wrote his greatest dramas, and, receiving protection from the king, he attacked the medical profession and medicine in general, with so much bitterness that as he had anticipated, the doctors refused to attend him in his last illness. He died on the seventeenth of February, 1673. "This same day, about ten o'clock at night, after the comedy, Monsieur de Molière died in his house, rue de Richelieu. He had played the part of the said *malade* (*Le Malade Imaginaire*) suffering from cold and inflammation which caused a violent cough. In the violence of the cough he burst a vessel in his body, and did not live more than half an hour or three-quarters after the bursting of the vessel." (La Grange: Register.)

To fully comprehend the causes that led Molière to wage a bitter warfare against medicine and the doctors, we must briefly review the medical history of the seventeenth century. Periods in which transpire changes from the accepted state of events and things are ever characterized by violence, satire and much bitterness. The seventeenth century is the transition era from mediæval irrationality and empiricism in medicine to modern scientific experimentation and rationality. In times of revolution, there are ultra-conservatives and ultra-radicals. The medical iconoclasts of the reign of Louis XIV were opposed by the unreasoning obstinacy of the Parisian medical faculty, who thought it a crime to venture out of the rut of prescribed practice. "Who shall judge when doctors disagree," is an old apothegm. The layman becomes puzzled and consults the quack, and the more strife and contention there is between the various schools of medicine, the more will quackery and dishonesty thrive. Between the violent radical and the obdurate conservative, the enlightened cool headed physician is lost sight of.

The practice of medicine in the seventeenth century was mere empiricism. The faculty was inculcated with the dignity of its profession, and laid much stress on the ceremonials of practice. The oath that a professor of medicine took when nominated is quite characteristic: "I here pronounce faithfully to teach in a long gown with wide sleeves, a doctoral cap on my head, a knot of scarlet ribbon on my shoulder." Nevertheless an epoch which could produce such men as Harvey, Sydenham, Malpighi, Willis and many other famous doctors whose names are almost household words, cannot be looked upon as a period of grotesque hypocrisy and profound ignorance. There must be another side to the matter, and the legend of the satirist must not be wholly taken for granted:

Longue peruque, habit grotesque,
Affecter un air pédantesque,
Cracher du grec et du latin,
Tout cela réuni fait presque,
Ce qu'on appelle un médecin.

Molière has tremendously exaggerated in the humorous episodes and the comic situations the true condition of his time. Disgusted as he was with science that was unable to cure his disease, (because no science could cure it), he sought aid amongst the quacks of the Pont Neuf; he consulted the town criers and the wandering mountebanks. If we examine the lives and works of leading physicians of Paris of the seventeenth century, we must inevitably come to the conclusion that

Molière's doctors, the Tomès, Desfonandrès, Macrotons, Bahis are mere burlesques. That they have survived such a long period is due to the fact that they are comical even if not true, and that in their conversation and behavior grains of realism may be discovered.

Molière was very well acquainted with the physicians of the court. Fagon was at that time the chief physician in attendance on the king, a position of great dignity and importance. Fagon occupied the chair of Botany in the *Jardin Royal*, and it was his endeavors and studies that added importance to the science of botany. He corresponded with the learned men of the whole world, and received from them rare botanical specimens which he stored in the *Jardin Royal*, making that institution the most famous museum in Europe. In the year 1665 he made the first catalog of this collection under the title of *Hortus Regius*. He was a most honest man. "His disinterestedness," says M. Fauvelle, "was as wonderful as his learning. He abolished the buying of offices in the learned colleges, and refused large sums of money that were offered him. His modesty was very great, and he always sought to avoid the honors that the faculty desired to confer on him. Compulsion was exerted to persuade him to accept his nomination to the *Academie des Sciences.*"

Dr. Fagon's co-worker was Armand de Mauvillain, the friend of Molière. de Mauvillain was a physician of the Montpellier school, and, therefore, an enemy of the Parisian faculty. It has been surmised that this doctor gave a helping hand to Molière in writing the satires on Medicine. Receiving the degree in medicine from the University of Paris in 1648, he settled in the capital and had quite a lucrative practice. With the advance of the teachings of Harvey and Malpighi, he became an adherent of the theory of the circulation of the blood. de Mauvillain was very learned and very liberal, and the conservatives considered him the anti-Christ of medicine. "If he did not resemble the physicians in Molière's dramas," says Professor Funck-Brentano, "it was because he was Molière's physician himself; and this is enough ground for believing that de Mauvillian, powdered and perfumed as he was, served and abetted his poet friend in order to ridicule his beloved colleagues of the faculty." (Funck-Brentano: Die Ærzte Molières.)

The Parisian college was against all modernism. Like the Chinese, the doctors had built a wall of stone and adamant against the ingress of advanced thought. As Dr. M. J. Conklin remarks, the spirit of the times is happily shown in the following extract from the statutes of the Academy at Helmstadt:

> **We desire the medical art, even as it was rightly and wholly fixed and handed down, under the guidance of God, by the artists Hippocrates, Galen and Avicenna, to be preserved and diffused by teaching. We recommend that all Empirics and the 'Tetralogies' of Paracelsus, with other corruptions of medicine not agreeable to the doctrines of Galen and Avicenne, be banished entirely from the academy.**

This doctrine was a stumbling block to the progress of all science.

In the reigns of Francis II, Charles IX, Henry III, and Henry IV, the faculty was bitterly embroiled with Ambroise Paré. As Mr. Stephen Paget says "it was a sort of Holy War for the deliverance of surgery from the bondage of medicine."

In the year 1575 (April 22), Paré published his book, a folio of 945 pages, on surgery. It was written in French, so that even a plain mortal (one not begowned or becapped) could understand every word of it. The Faculty became alarmed. On July 9 of the same year, they met and besides observing that Paré was only a barber surgeon, thrust amongst them by the king, ignorant of Latin and Greek, they charged him with gross indecency and immorality. Five days later, Parliament called the case for hearing, and carrying the farce to the end, decided that Paré had no legal right to publish a work on medicine without first receiving permission from the faculty. The defence of the eminent surgeon was quite a shaft of sarcasm against ignorant intolerance:

> **For more than thirty years I have been printing my treatises on surgery . . . . which made me think, if I gathered them together, I should be doing a thing very agreeable to the public. Having accomplished it, and that at an expense past thinking—lo and behold—the physicians and the surgeons have set themselves to obscure and suppress them, for this sole reason, that I wrote in our mother tongue, in phrases quite easy to be understood. The physicians feared lest all who should get the book into their hands would be advised how to take care of themselves in time of sickness, and would not be at the pains to call them in. The surgeons were afraid lest the barbers, reading these, my works, would receive full instruction in all the operations of surgery, and would come to be as good as themselves and thus trespass on their domains.**

When Paré planned to publish his *second* edition, he consulted the faculty, and in order to please them, he removed his obnoxious articles on fevers (which only physicians could write about) and included his observations on that subject in his discussion of tumors. This modesty and meekness pleased the "congregated college," and they did not oppose the publication of this work. (S. Paget: Ambroise Paré and His Times.)

The faculty in the time of Louis XIV was the same in aspirations and ideas as the faculty in the times of the last Valois. Surgery was opposed because no dignified physician would hold a knife in his hand, and to elevate the barber to the dignity of a doctor was not to be thought of. Circulation of the blood was proscribed because it was English. If the blood did circulate it was against the laws of the faculty. It had no business to flow contrary to the beliefs of Hippocrates and Galen. "Besides," said they, "if the blood circulates, it is useless to bleed, because the loss sustained by an organ will be immediately repaired, hence bleeding is useless, therefore the blood does not circulate."

The prescribing of antimony was prohibited by the faculty at Paris, for the simple reason that the faculty of Montpellier highly recommended it. de Mauvillain espoused the cause of antimony and circulation of the blood and was, therefore, ostracized from the association of physicians.

As strict partisans of the principles of the Parisian faculty, Jean Riolan (1577-1657) and Guy Patin (1601-1672), stand preëminent. Patin, "polemical medical man and clever humorist of that day," said of Riolan that he would rather

give up a friend than an assertion. They were strict adherents of the Iatro-chemical school, founded by Sylvius, "which like other systems, might rather be called a systemic phantasy." This system is based upon the elements of chemistry—the improved successor of alchemy and the first step toward true chemistry—; upon the new knowledge of the circulation of the blood; and upon the closer acquaintance with the chyle and lymph vessels (which had been acquired in this period), as well as upon the old doctrine of the "spiritus and the calor innatus" of the heart. His system, although its author always professes to accept only "experience by means of the senses, is constructed far less upon experience than upon false conclusions drawn from experimental observations, whose connection with his theory is on the whole arbitrary and forced." (J. H. Baas: Geschichte der Medicin.)

Opposed to their beliefs were the theories of the Iatro-mathematical school whose motto was, "In your practice, concern not yourselves with theories." The originator of this system was Santorio Santoro (1561-1636), Professor in Padua and Venice. Their idea was to treat all things with precision, and that all functions in the body were physical rather than chemical. "Thus digestion was referred to as a process of mechanical trituration, and the absorption of chyle was explained as due to the pressure arising from the action of the intestinal movements upon the comminuted food. In a similar way the secretions were referred to as the resistance created by the corners, curves, angles, etc., of the vascular system, and so on."

Guy Patin was a learned man, a brilliant writer and thoroughly acquainted with the Latin language, which he wrote to perfection. "His creed contained but two articles—bleeding and purging with Senna." Certainly he was not a quack, but with mediæval intolerance he opposed all who were against the existing order of things. It might have been of him that Molière has said "that a dead man is only a dead man, and is of no consequence, but a neglected formality does great harm to the entire profession." Guy Patin strongly believed in having his patients die "according to rule rather than to recover in violation of it."

Molière ridiculed all physicians and all medicine. He had no more respect for the "outside doctor"—him of Montpellier—than he had for the members of the Parisian faculty. He was especially venomous against the medical profession because of their seeming ignorance and lack of skill. Suffering as he did from a painful disease he became morose and disgusted with the futility of prescriptions. Whether it was aneurysm of the aorta or pulmonary tuberculosis, as has been surmised by some, in any case, accompanied as it was by hypochondriasis, it was sufficient to especially interest him in the medical factions of his day. He ridiculed all of them impartially.

Molière's dramas against medicine began in his "barn storming" days. "The Flying Physician" and "The Physician in Love" are two plays of inferior quality written by the dramatist at the very beginning of his career. The latter drama is lost. In *Le Médecin Volant* we find Molière's first attack on medicine. Sganarelle, the famous rogue, undertakes to impersonate a learned physician, in order to aid his master in his love affair. He assumes the doctor's gown and talks with the pedantic air, which Molière thought was characteristic of the physician:

Hippocrates says, and Galen, by undoubted arguments, demonstrates that a person is not in good health when he is ill. You are wise to place all your hope in me; for I am the greatest, the noblest, the most learned physician in vegetable, sensitive and mineral faculty.

Unlike other physicians he not only looks at the urine but also tastes it, but like them he is a stickler for formality. Upon being told his patient is dying, he exclaimed:

Ah! let her be careful not to do so; she must not amuse herself by allowing herself to die without a prescription from the doctor.

This last remark, the author was very fond of repeating, and we find it again in 'The Physician in Spite of Himself.'"

In another of his farces "The Jealousy of Le Barbouillé" written during his provincial career the doctor is still more ridiculed. Le Barbouillé is plagued by a shrewish wife, who, as fate would have it, always gets the upper hand of him. The unfortunate husband seeks advice from a doctor, and like a good business man, accosts the physician and immediately comes to the point:

Le B: "I desire to beg for an opinion on a question of great importance to me."

The doctor, ever wakeful to the danger of losing his dignity, replies in what he endeavors to make a very reproving statement:

You must be very ill bred, very loutish and very badly taught, to speak to me in that fashion, without first taking off your hat, without observing *rationem loci, temporis et personæ*. What! You begin by an abrupt speech, instead of saying *Salve, vel salvus sis, doctor doctorum eruditissime*. What do you take me for, eh?

No apologies will help. In endeavoring to excuse himself, poor Le Barbouillé gets more entangled. What astounds him most is that the doctor does not care for money. "Well, I made a mistake," he soliloquizes puzzled. "Seeing him dressed as a doctor, I felt that of necessity I must speak of money to him, but since he does not want any, nothing can be more easy than to satisfy him." The doctor is a very verbose individual who is continually advising his hearers to be brief. The stage direction in the seventh scene is interesting:

All wish to explain the cause of the quarrel: The doctor explains that peace is a fine thing. They all talk together, and make a dreadful noise. In the midst of all this Le Barbouillé ties the doctor by the legs with a rope, throws him down on his back, and drags him away. The doctor goes on talking all the time, and counts all his arguments on his fingers, as if he were not on the ground.

Molière took a general interest in the educational affairs of France. In *Le Marriage Forcé* he throws a shaft at the University of Paris, which was endeavoring to persuade Parliament to confirm a sentence dated Sept. 4, 1624, which condemned to death all those who would dare to attack the Aristotelian doctrine.

Sganarelle meets two philosophers discussing and quarrelling. He accosts one, and is met with gibberish that he does

not understand. "Devil take the scholars," he exclaims. "They will never listen to anybody. I see it was the truth I was told and that this Master Aristotle was a talker, and nothing else."

The doctor has a very good opinion of himself.

> Get along, you are more impertinent than the fellow who maintained that we ought to say the *form* of a hat instead of a *figure*, and I will prove it to you at this time, by the help of demonstrative and convincing reasons, and by arguments *in Barbara*, that you are and never will be anything but a simpleton and that I am and ever shall be, *in utroque jure*, the Doctor Pancrace. . . . A man of sufficiency, a man of capacity, a man finished in all the sciences, natural, moral, and political. A savant, savantissime, *per omnes modos et casus*. A man who has a knowledge suptrlative of fables, mythologies, and histories; grammar, poetry, rhetoric, dialectics, and sophistry; mathematics, arithmetic, optics, ornieritics, physics and metaphysics; cosmometry, geometry, architecture, speculary, and speculatory sciences, medicine, astronomy, astrology, physiognomy, meteposcopy, chromancy, geomancy.

The doctor gets out of breath naming all these true and pseudo branches of learning. He is very intolerant of a diverse opinion, and would condemn anyone to the galleys or scaffold for contradicting him.

Molière ever attacks vice, undauntedly, uncompromisingly. He seems to fear to be too lenient with corruptions, lest he himself become indifferent. Pope well puts it:

> Vice is a monster of such frightful mien,
> That to be hated needs but to be seen,
> Yet seen too oft, familiar with her face
> We first endure, then pity, then embrace.
>
> —*Essay on Man.*

Not all the doctors of Molière are so indifferent in money matters as is the savant Pancrace of *Le Marriage Forcé*. In fact, the humorist rarely imagined a physician who was not absorbed in money making. He is not harsh with weaklings and sinners. He laughs at them heartily, and he expects us not to condemn his Sganarelles and Gros-Renés and Mascarilles. It is true that they are deep-dyed rogues but he smiles at their escapades and is very lenient with their delinquencies. Not so with the physicians and savants. There always seems to be something rankling in his heart against these learned men. He considered them hypocrites, fools, and villains. Humorist though he was, he never kept his sense of humor in dealing with doctors. Molière's suave and witty testimony cannot be accepted before a court of justice. Molière does not bear true witness.

Critics and editors of Molière always feel themselves called upon to defend the dramatist for his attacks on the doctors. Mr. Chatfield-Taylor in his admirable biography devotes a whole chapter to the strife between Molière and the faculty, and he covertly sneers at the College of Medicine, who, when they congregated, resembled more an assembly of Roman Senators than a meeting of French scientists. Professor Charles Heron Wall in his introduction to *Monsieur de Pourceaugnac* finds it necessary to state that "the attacks upon the doctors are not exaggerated." In their endeavor to defend the critics become partial and unjust.

Monsieur de Pourceaugnac is perhaps the best farce ever written, and Molière did not feel called upon to do anything but cause uproarious laughter. He does not attempt to amuse us with the sharp witticism of the comedian; instead, he employs the broad humor and crude jests of the clown.

M. de Pourceaugnac, a lawyer from Limoges, has come to Paris to marry Julia the daughter of Oronte. He is unacquainted with Paris and is easily led astray. Julia does not feel inclined to obey her father, and her affections are centered upon Eraste, a young fashionable gentleman. In order to circumvent the meeting between Pourceaugnac and Oronte, Serigani the servant of Éraste persuades the unfortunate countryman to place reliance on Éraste and himself. Unsuspecting, he is conducted to two physicians, who readily believe Serigani that Pourceaugnac is insane, and ignoring the wretched man's protestations, they argue and debate in their usual pedantic style over the malady of their patient. The consultation between the doctors is extremely witty. After the senior physician has given a very lengthy and laughingly learned discussion of the case, the junior doctor, in rapt admiration, replies:

> Heaven forbid, Sir, that it should enter my thoughts to add anything to what you have just been saying. You have discoursed too well on all the signs, symptoms and causes of this gentleman's disease. The arguments you have used are so learned and so delicate that it is impossible that he is not insane and hypochondrically melancholic; or were he not, that he ought to become so, because of the beauty of the things you have spoken and of the justness of your reasoning. Yes, sir, you have graphically depicted, *graphice depinxisti*, everything that appertains to this disease. Nothing can be more learnedly, judiciously and ingeniously conceived, thought, imagined than that you have delivered on the subject of this disease either as regards the diagnostic, the prognostic or the therapeutic, and nothing remains for me to do but to congratulate this gentleman upon falling into your hands. All I should like to add is to let all his bleedings and purgings be of an odd number, *numero deus in pare gaudet*, to take the whey before the bath, and to make him a forehead plaster, in the composition of which there should be salt—salt is the symbol of wisdom.

There is one thing about this comedy that is gratifying to the doctors and this is that Molière as pointedly attacks the lawyers as he does the physicians. In fact, he ridicules the men of law more than he does the practitioners of medicine. They have a refrain which they are constantly reciting:

> Your deed
> Is plain and clear
> And all the gear
> Of wigs and law
> Upon this flaw
> One verdict bear . . . .
> Polygamy's a case, you find,
> A case of hanging.

Only one man who was not a doctor took up arms in defense of the medical faculty. Le Boulanger de Chalussay wrote a comedy entitled *Élomire Hypochondre, ou Les Médecins Vengés* in which he ridiculed Molière (Élomire) and his wife, and represents the doctors as learned men who take vengeance on the mortal who has dared to attack the dignity of the most

ancient and honorable profession. The play produced a great furor, and the conservatives were extravagant in its appreciation.

Unto death Molière despised physicians. His last comedy, *Le Malade Imaginaire*, was written at a time when he was very ill and nearly dying. Molière himself acted the part of Argan, the imaginary invalid. This drama is very laughable. The story is very simple. Argan, the imaginary invalid, is constantly employing a physician to prescribe for him. As his second wife says, "He is a wretch, unpleasant to everybody, of nauseous dirty habits, always a clyster or a dose of physic in his body." His wife pretends great affection and diplomatically so manages affairs that her husband should make his will in her favor, thus dispossessing her step-daughter Angélique. Her plan would have been successful but for Toinette the maid of the intended victim. Argan, desiring to reduce his doctor's bills, hits upon the remarkable scheme of marrying his daughter (who is in love with a young, handsome gentleman) to his physician's son.

The curtain rises upon Argan sitting alone and adding up his apothecary's bill.

Item, on the 24th, a small insinuative clyster, preparative and gentle, to soften, moisten and refresh the bowels of Mr. Argan—thirty sous.

Item, on the said day in the evening, a julep, hepatic, soporiferous, and somniferous, intended to promote the sleep of Mr. Argan—thirty-five sous.

Item, on the 26th, a carminative clyster to cure the flatulence of Mr. Argan.—thirty sous.

And more, and still more. A goodly list and quite lucrative for the medical man in this case.

When the intended son-in-law, who is to receive his doctor's degree in three days, comes to visit the Argan family, he proves positively that he is invested with great learning. He mistakes the step-mother for Angélique and pays her compliments intended for his belamour. His father, Doctor Diafoirus, is constantly prompting him as to good manners and fashionable etiquette. His father, in praising him, says:

"In all disputations has he rendered himself formidable, and no debate passes but he goes and argues loudly and to the last extreme on the opposite side. He is firm in dispute, strong as a Turk in his principles, never changes his opinion, and pursues an argument to the last recesses of logic. . . . . But, above all, what pleases me most is his blind attachment to the principles of the ancients, and that he would *never listen* to the pretended discoveries of our century concerning circulation of the blood and other opinions of the same stamp."

In other words, asinine obstinacy is the marked characteristic of the future practitioner. In reading these lines we are reminded of the famous hero of Butler's panegyric on Puritanism. Hudibras, likewise, was strong in debate:

He was in logic a great critic,
Profoundly skilled in analytic;
He could distinguish and divide
A hair 'twixt south and southwest side;
On either which he would dispute,
Confute, change hands, and still confute.
He'd undertake to prove by force
Of argument, a man's no horse;
He's proved a buzzard is no fowl,
And that a lord may be an owl;
A calf an alderman, a goose a justice,
And rooks, committeemen and trustees.
He'd run in debt by disputation.
And pay with ratiocination,
All this in syllogism true,
In mood and figure, he would do.
(Hudibras, Part I, Canto I.)

The young doctor is very gallant. He graciously invites his lady-love to amuse herself by assisting at the dissection of a woman upon whose body he is to give lectures; a new and improved method of gratifying the desire for fun in a young girl!

Once M. Argan refuses to take a prescription of his physician. The latter does not seem at all pleased about it:

What daring boldness; what a strange revolt of a patient against his doctor! . . . . A clyster which I have had the pleasure of composing myself, invented and made up according to all the rules of art. . . . . A case of high treason against the faculty.

The final scene is an interlude representing the admission of a student to the degree of doctor of medicine. The scholars and professors recite a piece composed of dog-Latin and French praising medicine, and in a burlesque manner they march on the stage with clysters and bleeding pails. Their refrain is:

Clysterium donare,
Postea seignare,
Ensuita purgare.

Really not a bad remedy for all diseases.

Like Rabelais before him, Molière always makes us laugh, but more than that he makes us think. Undaunted, he stood alone and battled with those in authority. Their endeavors to harm him proved fruitless and he escaped unscathed. Undoubtedly Molière had great influence upon his contemporaries and we notice great improvement in the proceedings of the Medical Faculty in the early part of the eighteenth century. We should not consider Molière as an enemy of medicine, but as a critic of the ignorance and intolerance of the medical practitioners.

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THE NEW DEPARTMENT IN THE JOHNS HOPKINS UNIVERSITY.

"ART AS APPLIED TO MEDICINE."

By MAX BRÖDEL,

Associate Professor of Art as Applied to Medicine.

The illustrations of medical publications are as a rule far below the standard set by other publications, both in regard to the correctness of the pictures and their artistic merits. In many instances, in fact, medical illustrations do not aid the text, but rather obscure it, and are often crude in the extreme. Illustrations of medical books are a highly specialized form of art, requiring on the part of the artists not only reliable draughtsmanship and adequate technique, but also a thorough understanding of medicine in most of its branches. It is obvious that a medical illustration can never be a success if the artist does not fully comprehend the object which requires illustration. It is hopeless here more than elsewhere in art for an artist to attempt to draw or paint an object of which he has no clear conception. Such a conception is absolutely necessary because it serves to create a picture in the artist's mind which must be the forerunner or model of the actual picture afterwards upon his paper. Upon the clearness of this mental picture depends the scientific as well as the artistic value of the drawing, for only under this condition can the artist's hand work with freedom and precision.

All medical illustrators of the present day are self-taught, because hitherto there has been no school where instruction in this important branch of art could be obtained. Most of them have been compelled to go through a long and tedious period of self-instruction marked by many failures. Their development has for the most part been a process of groping in the dark with an occasional success in the latter part of their career. Some of the best have died without having had an opportunity to train a successor, and the experience they have gained and the methods they have gradually evolved have thus been buried with them. No science, no art can ever develop to a high degree unless a new generation can base its methods upon the work of the last generation and thus profit by the failures and successes of others.

For this reason a department has been created in the Johns Hopkins University to be known under the general title "Art as Applied to Medicine." Its purpose is to bridge over the gap existing between art and medicine, and to train a new generation of artists to illustrate medical journals and books in the future and to spare them the years of trial and disappointment of their self-taught predecessors. In view of the fact that medical illustrating is midway between art and medicine, it is proposed that the instruction given be designed for the needs of two classes: (1) For medical students, and (2) for artists. Experience in the past has taught us that promising pupils can be obtained from both medical students and artists.

The following is the plan according to which the proposed course will be given:

A. COURSES FOR MEDICAL STUDENTS.

1. A course of lectures to first-year class for one hour a week during the first trimester. This course is intended to give general instructions in the elementary principles of drawing and sketching as an aid to the study of medicine.
2. A short course in artistic anatomy to be given during the second trimester. The purpose of this course is to supplement the study of the cadaver in the dissecting room.
3. A course in actual drawing open to students of the four classes, to research workers and to members of the faculty for two hours twice a week throughout the year. This course will be limited to 12 students.

   The work will first deal with the exact study of the plastic representation of medical objects of all kinds. Later on this will lead to the study of diagrammatic drawings and sketches useful in taking medical histories or illustrating lectures with blackboard sketches. Lastly, a suitable technique for making medical illustrations for publication will be taught.
4. Research workers who require pictorial representation of their research will be taught the principles of making such drawings.

B. COURSES FOR ARTISTS AND ART STUDENTS.

1. Special instructions to medical illustrators who desire to take up advanced work in a particular branch. The fee will depend on the length of the course and the character of the instructions. Minimum fee $25.00. Such courses may be taken at any time during the academic year.
2. A regular course for beginners. This course will continue during the entire day throughout the academic year (October 1-May 31).

   Applicants who are not graduates of an art school must submit samples of their art work. The duration of the whole course will of necessity depend on the talent of the individual, the average term, however, not exceding two years. The fee is $100.00 a year.

   Drawings of especial merit may be accepted and utilized by the department for publication and as a practical test of the artist's ability. Although such drawings become the property of the school, the student will receive several printed proofs after publication. All drawings and sketches not so honored will remain the property of the student. The above course will be as follows:

   a. Anatomical studies of the skeleton, muscles and viscera from the standpoint of the medical illustrator. Everything studied is sketched or drawn.

   b. Studies of fresh material at autopsies combined with microscopic studies of the various tissues in health and disease. A number of accessory methods will be employed in studying fresh tissues.

   c. Studies of hardened specimens from the various pathological collections combined with the study of the texture of the individual structures of the body.

   d. Based on the foregoing the student is ready to study the pictorial representation of physical examinations, various kinds of treatment, and the different steps in surgical operations.

   e. Stress will be laid on the correct attitude of the medical illustrator toward problems in medical research and toward the conception of a medical illustration in general as an aid to the text and also as a work of art.

   f. Parallel with and supplementing these studies will be instructions and demonstrations in the various techniques suitable for medical illustrations intended for publication. These are:

      (1) Half-tone drawings in crayon, etc.—Mixed technique.

      (2) Water-color painting.

      (3) Line drawings in pen and ink. Diagrams.

      (4) Charts for class demonstrations.

   g. Studies of the various methods of reproduction from the standpoint of the illustrator.

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